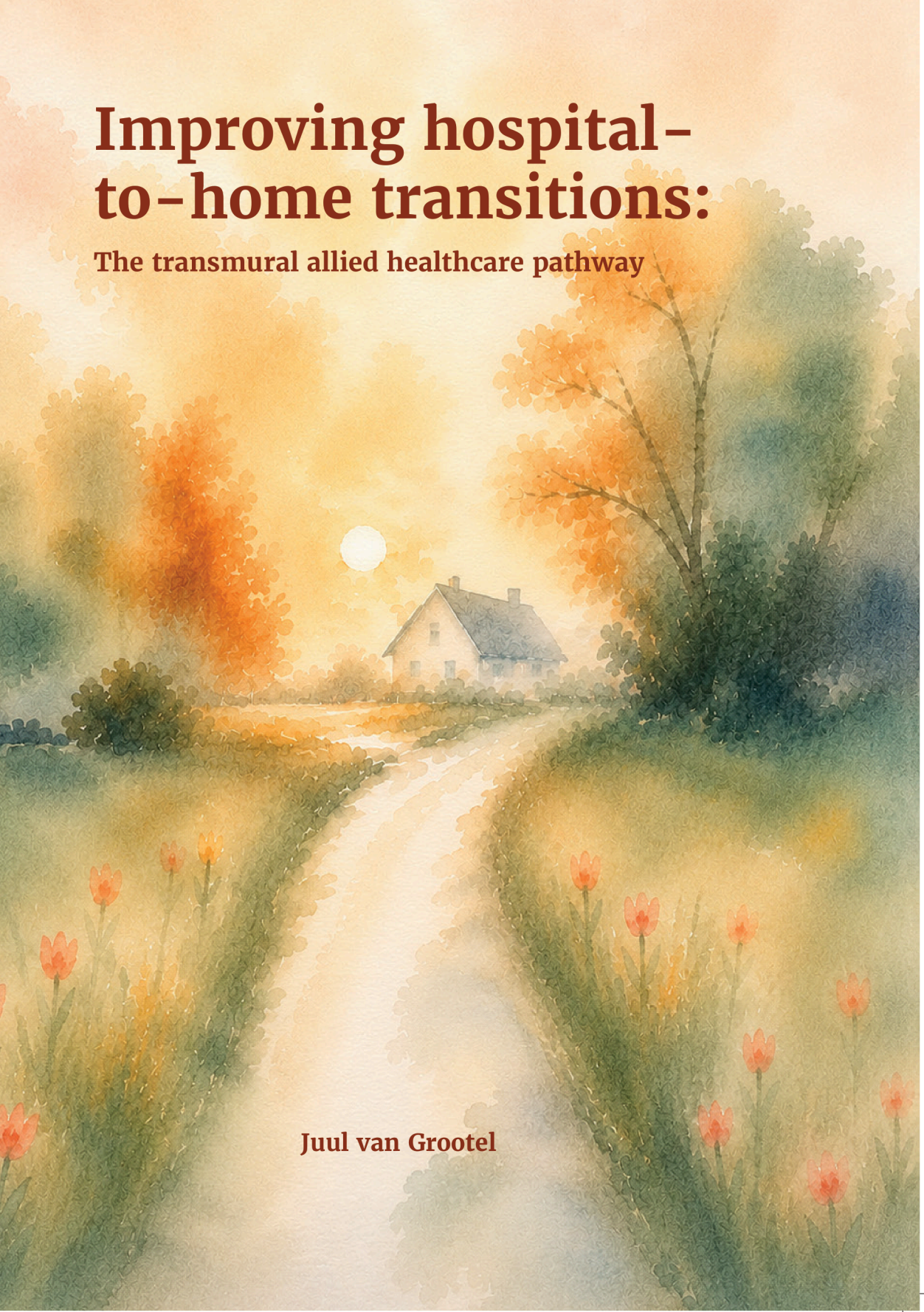
Improving hospital-to-home transitions:

The transmural allied healthcare pathway



Juul van Grootel

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Improving hospital-to-home transitions: The transmural allied healthcare pathway

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aan de Universiteit van Amsterdam
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in het openbaar te verdedigen in de Agnietenkapel
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Chapter 1

General introduction, aim and outline of this thesis

GENERAL INTRODUCTION

Complexity of hospital-to-home transitions

People are living longer worldwide, resulting in ageing populations. In 2024, around 10.3% of the global population was aged 65 years or older (1). In the Netherlands, this proportion increased from 12.8% in 1990 to 20.0% in 2020 and is expected to reach 25% by 2050 (2, 3). As populations age, the prevalence of multimorbidity also increases. Multimorbidity, defined as the coexistence of two or more chronic conditions, affects about 37% of older adults and is frequently accompanied by frailty (4). Frailty is characterized by reduced physiological reserves and increased vulnerability to adverse outcomes, including fatigue, functional decline and unplanned hospital admissions; in older adults admitted to hospital this vulnerability often leads to functional deterioration during and after the hospital stay, with frail patients experiencing more disability and slower recovery (5, 6).

From a rehabilitation perspective, the consequences of multimorbidity and frailty often result in problems across multiple domains of functioning. The International Classification of Functioning, Disability and Health (ICF) conceptualize functioning as the dynamic interaction between health conditions, body functions and structures, activities, participation, and contextual factors (figure 1) (7). Older adults with multimorbidity and frailty frequently experience limitations across several of these domains, leading to complex care needs, hereafter referred to as patients with complex care needs (figure 2). In this context, complexity refers to the presence of multiple, interrelated problems affecting physical, psychological, and social functioning. These combined challenges affect recovery and necessitate coordinated, interdisciplinary transitional care (8, 9).

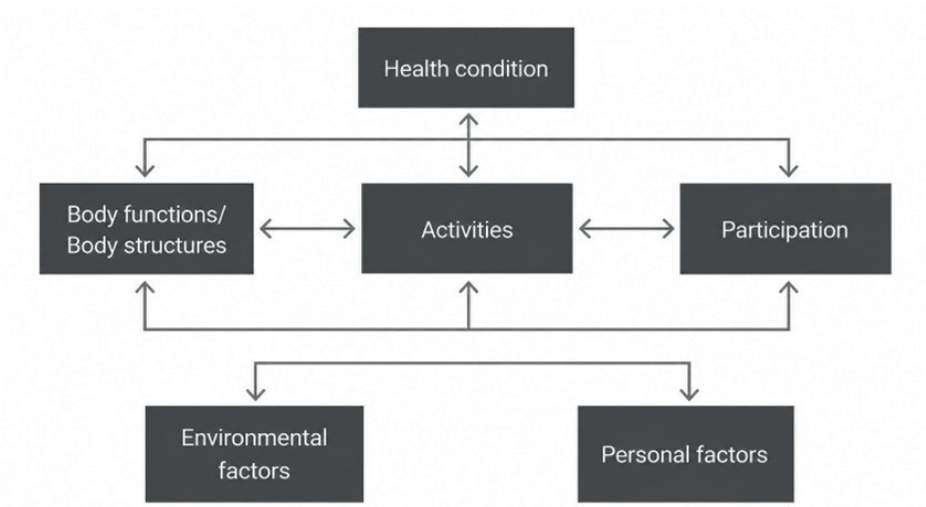


Figure 1: The International Classification of Functioning, Disability and Health (ICF)

In daily clinical practice, the rise in patients with complex care needs is clearly visible. Healthcare professionals working in hospitals increasingly encounter patients with two or more chronic conditions who already struggled with daily functioning at home, sometimes compounded by limited health literacy or restricted access to support. Such situations have become common rather than exceptional. Upon hospital admission, it is important to rapidly gain a comprehensive understanding of the patient's medical, functional and social situation, prioritize urgent problems, and initiate appropriate interventions, all within a limited timeframe of the hospital stay. In the Netherlands, the average length of a hospital stay has decreased over the past years and now approximates five days (10). As a result, a major part of the recovery process takes place at home, where patients are expected to regain daily functioning and manage their conditions.



Image created with AI
Figure 2: A patient with complex care needs

The transition from hospital-to-home is a crucial phase, yet patients frequently experience fragmented care, which is associated with unplanned readmissions and increased healthcare costs (11-13). Although hospital-to-home transitions have been widely studied, most existing pathways focus on nursing care, medication management (14-16) or on specific patient groups such as patients with stroke (17, 18). Despite the central position of allied healthcare professionals in the assessment of physical functioning, supporting functional recovery and promoting continuity of care across settings, their role has so far been insufficiently addressed.

In this general introduction, I will introduce the concept of transitional care, highlight the central role of allied healthcare in hospital-to-home transitions, emphasize the importance of interprofessional collaboration, and discuss the need for implementing and evaluating transitional care interventions in clinical practice. I conclude with the aim and outline of this PhD thesis.

Transitional care

Transitional care covers the services that support patients as they move between healthcare settings (figure 3) (19). Transitional care is particularly

important for older adults with complex care needs, who often interact with many professionals and frequently transition across settings. In this context, the emphasis is on interventions that facilitate coordination, communication, and alignment of care across settings, rather than on clinical care delivered during the transition itself. Ineffective transitional care can lead to adverse outcomes, such as functional decline, readmissions, and reduced quality of life. Research indicates that transitional care interventions should remain practical rather than highly complex, as extensive multicomponent programs are rarely feasible in routine care (13). Components that have shown effectiveness in reducing unplanned readmissions and mortality, and in improving quality of life and physical functioning, include among others *comprehensive needs assessment*, *family involvement*, *case management* and *telephone follow-up* (13, 19).

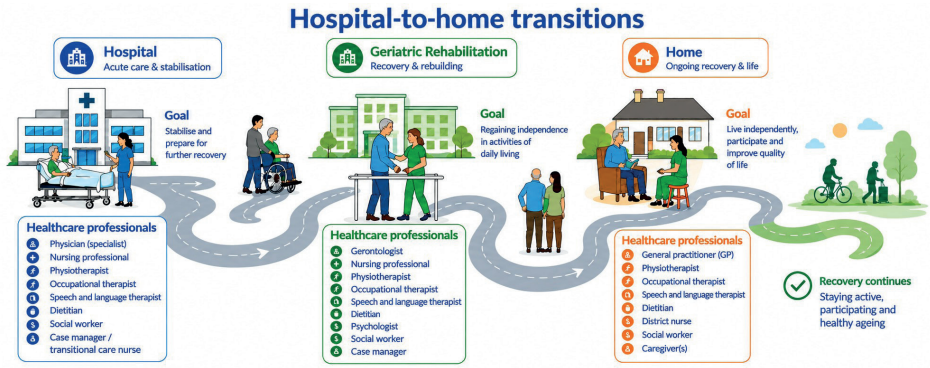


Image created with AI

Figure 3: Support during hospital-to-home transitions

Interprofessional collaboration

Effective hospital-to-home transitions require strong interprofessional collaboration across settings. Integrated collaboration enables professionals to share expertise, align goals and develop coordinated care plans. The World Health Organization emphasizes interprofessional collaboration as essential for addressing complex care needs and reducing fragmentation in care pathways (20, 21). In contrast to multidisciplinary approaches, which often involve parallel contributions, interprofessional collaboration is characterized by closer interaction between professionals and the development of shared care plans. Evidence shows that such integrated collaboration is associated with safe, high-quality care, whereas poor collaboration can negatively affect healthcare delivery (22, 23). Despite growing recognition of its importance, interprofessional collaboration involving allied healthcare professionals across

hospital and community settings is often inconsistent, informal or insufficiently structured (24, 25). This contributes to variability in care quality, delays in follow-up and inadequate support for patients' functional recovery at home (26). These challenges highlight the need for structured, feasible transitional care interventions that explicitly include allied healthcare professionals and facilitate collaboration across settings.

The role of allied healthcare professionals

Allied healthcare professionals include professionals such as physical therapists, occupational therapists, speech and language therapists, and dietitians, with physical therapists forming the largest group in the Netherlands (27). They address patients' needs in line with the ICF and therefore play an important role in the transition from hospital-to-home (7). Because functional recovery largely occurs after discharge, continuity of allied healthcare is essential. Interruptions in allied healthcare may compromise recovery, increase the risk of complications, and lead to poorer outcomes, including decreased quality of life and higher readmission rates (13). Continuity of allied healthcare facilitates the transfer of hospital-initiated interventions to daily life, promotes self-management, and enhances participation of activities within the patient's home environment (28). Despite this important role, the contribution of allied healthcare professionals to transitional care remains insufficiently embedded in existing pathways, leaving a critical gap in the care continuum (13, 24).

IMPROVING HOSPITAL-TO-HOME TRANSITIONS USING A TRANSMURAL ALLIED HEALTHCARE PATHWAY

Designing transitional care interventions

Designing a transmural allied healthcare pathway requires a structured and evidence-based approach that reflects the complexity of hospital-to-home transitions. To guide this process, we used the six steps of Intervention Mapping (IM), a planning framework that combines theory, empirical evidence and stakeholder input, see figure 4 (29). IM has been widely applied in health promotion research, including studies on physical activity, obesity and sleep (30-32). Although IM has not yet been applied to optimize hospital-to-home transitions from an allied healthcare perspective, its core principles align closely with the challenges inherent to transitional care. Specifically, the problem-driven orientation, socioecological perspective and emphasis on co-creation reflect the dynamic interaction between patient, professional and organizational behaviors across care settings (29).

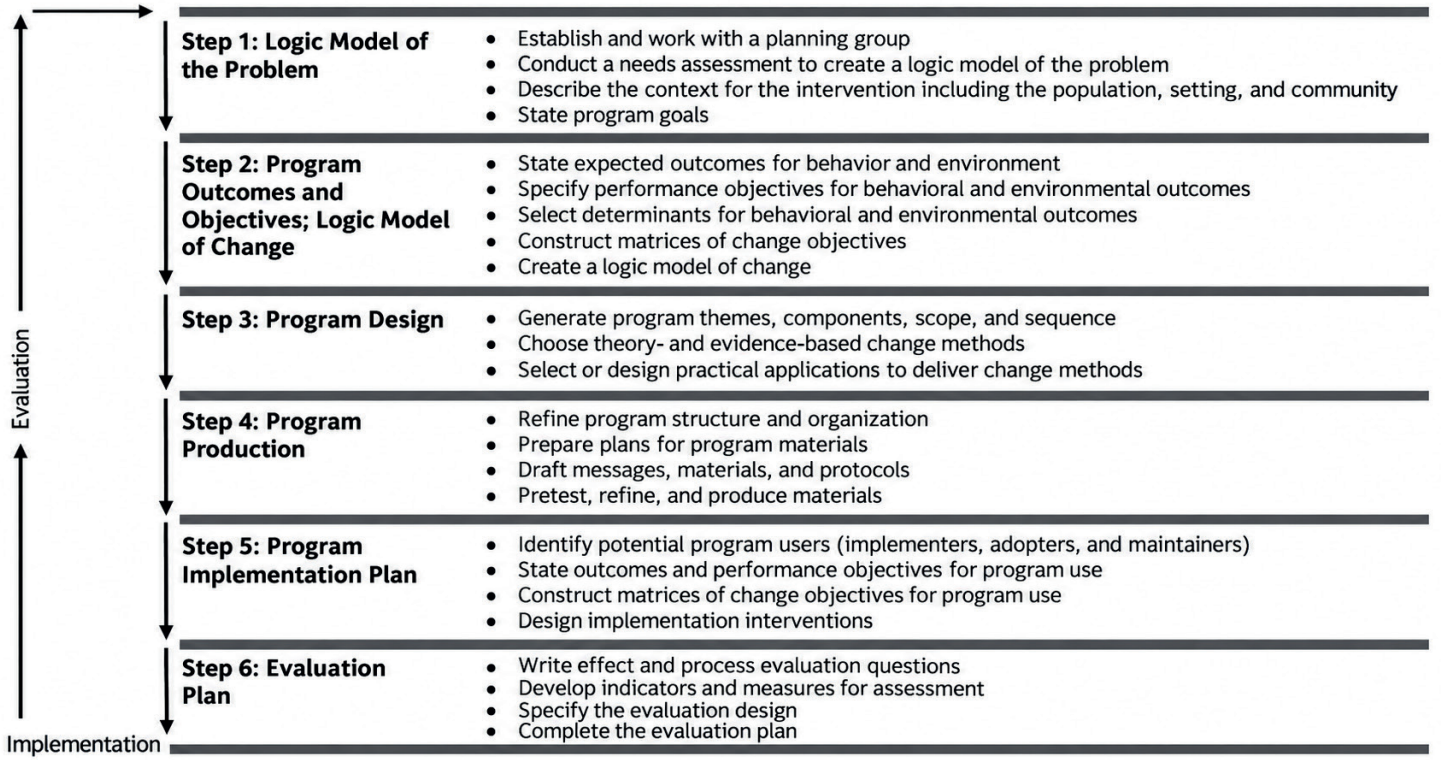


Figure 4: Intervention Mapping framework

Steps 1-2 of IM involve a needs assessment of the current situation. We began by exploring the experiences of patients with transitional care *(Chapter 2)* and the perspectives of healthcare professionals *(Chapter 3).* Given that evidence on these experiences was limited, these chapters aimed to identify experiences, challenges and unmet needs in current transitional care. To complement these insights, we conducted a systematic review synthesizing the experiences of patients, families, and healthcare professionals with transitional care *(Chapter 4),* as well as the impact of transitional care interventions on patient outcomes *(Chapter 5).* In addition, to support the practical design in IM steps 3-4, we examined which indicators professionals use to identify patients' allied healthcare needs *(Chapter 6).* Collectively, these chapters provide the evidence base that guided the design of our transmural allied healthcare pathway *(Chapter 7),* ensuring that the pathway addressed identified gaps in care and reflected the priorities of both patients and healthcare professionals.

"We must learn to navigate in a world of uncertainties and interdependencies."

— Edgar Morin

Implementing transitional care interventions

Many complex healthcare interventions fail to achieve their intended impact once implemented in routine practice (33). Although they may seem feasible during development, real-world implementation is often challenged by limited resources, competing priorities and insufficient attention to implementation science (34, 35). Embedding implementation frameworks early in step 5 of IM is therefore essential to increase the likelihood that interventions are adopted, sustained and translated into meaningful improvements in care (36, 37). The Consolidated Framework for Implementation Research (CFIR) is one of the most widely used frameworks to support this process. It offers a structured overview of determinants across five domains and helps identify context-specific barriers and facilitators (38). By systematically identifying barriers and facilitators within these domains, CFIR enables researchers and practitioners to tailor implementation strategies to their specific context, thereby increasing the likelihood of successful adoption and sustainability of complex interventions (38). These determinants can subsequently be linked to the Expert Recommendations for Implementing Change (ERIC), a taxonomy of concrete implementation strategies such as *audit and feedback*, *appointing local champions* and *developing educational materials* (39). Together, frameworks such as CFIR and ERIC help researchers to move from understanding contextual challenges to selecting and specifying actionable strategies that increase the

likelihood of successful adoption and sustainability of complex interventions (39). To deepen our understanding of such determinants in the context of transitional care, we synthesized facilitators and barriers for implementing multidisciplinary transitional care interventions using CFIR in a systematic review *(Chapter 8).* This information further informed the implementation plan, resulting in tailored implementation strategies for the care pathway.

Evaluating transitional care interventions

As implementation progresses, it is essential to understand not only whether an intervention is delivered as intended, but also how and why it works in practice. In step 6 of IM, a process evaluation helps clarify these mechanisms by examining the extent to which intervention components reach the intended population, how consistently they are delivered and how users experience them *(Chapter 9).* The RE-AIM framework provides a structured approach to this evaluation through its five dimensions: Reach, Effectiveness, Adoption, Implementation and Maintenance (40). Together, these dimensions offer insight into both the short-term functioning of an intervention and the conditions required for long-term sustainability. RE-AIM also encourages attention to real-world complexity, such as variations in patient needs, organizational constraints and ongoing adaptation by healthcare professionals. Achieving sustainable implementation is often challenging, as interventions must remain feasible, relevant and supported within dynamic clinical environments (41).

OUTLINE OF THIS THESIS

As outlined in the preceding section, the objective of this thesis was to improve the hospital-to-home transition for patients with allied healthcare needs. The project focused on the development, implementation and evaluation of a transmural allied healthcare pathway (TULIP) designed to strengthen interprofessional collaboration, enhance information provision and improve the quality of care during the transition from hospital-to-home. This allied healthcare pathway involves patients and healthcare professionals from the Amsterdam University Medical Centers, geriatric rehabilitation centers and primary care settings in the Amsterdam region in the Netherlands.

In *Chapter 2*, we reported on the first part of our qualitative needs assessment, in which patients and their families were interviewed about their experiences with hospital-to-home transitions.

In *Chapter 3*, we described the experiences of healthcare professionals with hospital-to-home transitions in a study using interviews and focus groups.

In *Chapter 4*, we provided insight into experiences with transitional care from the perspective of patients, families and healthcare professionals in a systematic review and meta-synthesis.

In *Chapter 5*, we presented a systematic review and meta-analysis on the impact of transitional care interventions, thereby concluding our needs assessment.

In *Chapter 6*, we presented indicators for healthcare professionals providing care for patients who need allied healthcare after hospitalization. This is accompanied by practical tools on how to use these indicators in clinical practice. Chapter 2-6 were used as a basis for the design of our transmural allied healthcare pathway.

In *Chapter 7*, we outlined the design of our transmural allied healthcare pathway following an iterative Intervention Mapping approach, with a specific focus on the first four steps of Intervention Mapping.

In *Chapter 8*, we provided information about the influencing factors for implementing transitional care interventions in clinical practice in a systematic review and meta-synthesis supported by the Consolidated Framework for Implementation Research.

In *Chapter 9*, we described the process-evaluation of the implementation of our transmural allied healthcare pathway using the RE-AIM framework, within patients with complex care needs after hospitalization.

In *Chapter 10*, we considered the collective results of the preceding chapters. We discuss the results in the light of current literature, as well as its strengths and limitations, and impact for practice and research, ending with a conclusion.

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Chapter 2

Engaging patients in designing a transmural allied health pathway: A qualitative exploration of hospital-to-home transitions

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ABSTRACT

Introduction

The transition from hospital to home is often suboptimal, resulting in patients not receiving the necessary allied healthcare after discharge. This may, in turn, lead to delayed recovery, a higher number of readmissions, more emergency department visits, and an increase in mortality and healthcare costs. This study aimed to gain insight into patients' experiences, perceptions, and needs regarding hospital-to-home transition, focusing on allied healthcare as a first step towards the development of a transitional integrated allied healthcare pathway for patients with complex care needs after hospital discharge.

Methods

We conducted semi-structured interviews with patients. Participants were recruited from university and general hospitals in the Amsterdam region between May-July 2023. They were eligible if they: 1) were discharged from hospital minimally 3 and maximally 12 months after admission to an oncologic surgery department, internal medicine department, intensive care unit, or trauma center, 2) received hospital-based care from at least one allied healthcare provider, who visited the patient at least twice during hospital admission, 3) spoke Dutch or English, and 4) were 18 years or older. Interviews were audio-recorded and transcribed verbatim. We performed a thematic analysis of the interview data.

Results

19 patients were interviewed. Three themes emerged from the analysis. "*Allied healthcare support during transition*" depicts patients' positive experiences when they felt supported by allied health professionals during the hospital-to-home transition. "*Patient and family involvement*" illustrates how much patients value involvement of their family members during discharge planning. "*Information recall and processing*" portrays the challenges of understanding and remembering overwhelming amounts of information, sometimes unclear and provided at the wrong moment. Overall, patients' experiences of transitional care were positive when they were involved in the discharge process. Negative experiences occurred when their preferences for post-discharge communication were ignored.

Conclusions

This study suggests that allied health professionals need to continuously collaborate and communicate with each other to provide patients and their families with the personalized support they need. To provide high-quality and person-centered care, it is essential to consider how, when, and what information to provide to patients and their families to allow them to contribute to their recovery actively.

Patient or Public Contribution

The interview guide for this manuscript was developed with the assistance of patients who reviewed it and provided us with feedback. Furthermore, patients provided us with valuable experiences by participating in the interviews conducted for this study.

INTRODUCTION

The aging population and the number of people living with complex care needs will increase in the coming decades, coinciding with an increased need for comprehensive healthcare, including allied healthcare, across multiple care settings (1). Patients with complex care needs are defined as patients who suffer from multiple chronic conditions, mental health problems, drug interactions, and social vulnerability, which can lead to overuse, underuse, or misuse of healthcare services (2). In 2018, 27.2% of US adults had multiple chronic conditions (3). In the Netherlands, in 2021, 5.7 million people suffer from more than one chronic condition (4). Due to the growing population with complex care needs, the stress on the healthcare sector will likely increase since these patients require more attention as their treatments are complex (5). In addition, healthcare costs in the Netherlands increased in 2021 with 7.6% to 125 billion euro compared to 2020 (6). In the Netherlands, people pay fees for their health insurance. Healthcare costs are partially paid for by the state (see appendix 1).

The hospital-to-home transition is a sensitive moment for patients with complex care needs. After hospitalization, there is an increased risk of adverse events, which may require medical attention and may ultimately lead to hospital readmissions (7). Current readmission rates range from 10 to 30%, and the associated expenses increase in equal measure (8). Research also shows that a significant proportion of patients with complex care needs reports a suboptimal transition from hospital to home (9). Ineffective communication and transfer of information during this phase can negatively affect patient safety and continuity of care (10, 11). Although previous research emphasized that a multidisciplinary approach is essential to optimize patient recovery, one-way handovers from hospital to primary care (allied) health professionals remain the most common way of discharge communication (12). Allied health professionals are pivotal in ensuring optimal patient recovery. They support patients in reaching their rehabilitation goals during and after hospitalization regarding physical and cognitive functioning, psychosocial health, and post-discharge needs (13).

Previous research has focused on physician- and nurse-led interventions to improve transitions regarding (nursing) care needs or medication adherence (14, 15). While Research shows that access to allied healthcare during and/or after discharge can prevent or reduce the risk of readmissions (16-18). However, there is a need for more holistic transitional care interventions (i.e., actions designed to ensure coordination and continuity of care between

different locations or levels of care), and integrated care provided (i.e. actions ensuring individuals receive the right care, in the right place, at the right time) by allied health professionals (19). This study aimed to gain insight into patients' experiences, perceptions, and needs regarding hospital-to-home transition, focusing on allied healthcare as a first step towards the development of a transitional integrated allied healthcare pathway for patients with complex care needs after hospital discharge.

MATERIALS AND METHODS

This study is part of the transmural allied healthcare pathway (TULIP)-project, which aims to improve the transition from hospital to home for patients with complex care needs, focusing on allied healthcare. A qualitative study was conducted by the Amsterdam University Medical Centers (AUMC) to obtain data on experiences, perceptions and needs surrounding the transition homewards and continuity of care. The consolidated criteria for reporting qualitative research (COREQ) checklist was used (20). The AUMC provided a waiver for this study (METC 2023.0119). Written informed consent was obtained from all participants.

Patients who had been admitted to the intensive care unit (ICU), trauma surgery, internal medicine and/or oncologic surgery wards participated in this study. Patients were eligible if they: 1) had been discharged from the hospital minimally 3 and maximally 12 months before the interview, 2) received care from at least one allied health professional (physical therapist, dietician, occupational therapist or speech- and language therapist), who visited the patient at least twice while being in hospital, 3) spoke Dutch or English, and 4) were 18 years or older. Relatives were allowed to attend the interview at the patients' request.

Participants were sampled purposively on the basis of the ward they were admitted to. Patients and relatives were recruited via the aforementioned hospital wards, the AUMC outpatient clinics and patient organizations (Sepsis & Daarna, FCIC and IC Connect). The physicians of AUMC and patient organizations contributed to recruitment of the patients. Physicians assisted in identifying eligible patients and asked patients if a researcher could contact them by phone. The primary researcher assessed the eligibility of the patients in concordance with the rules and regulations of the Medical Ethics Committee. Data collection occurred concurrently. Patient inclusion continued until no new

themes emerged from the data. This point was determined together with RC and MM after transcribing, coding and analyzing the first 15 interviews.

Data collection took place between May and July 2023. Interviews were held face-to-face at the participants' location of choice or via video call. Semi-structured interviews were conducted by JvG. The research team members had a background in Clinical Epidemiology (RC), Human Movement Sciences (JvD/SW), Physiotherapy (MvdS/JvG/RC/SW/EG/MvdL/MM), and Health Technology Assessment (JvD). Through several meetings with experts, an interview guide was developed. The interview guide was pilot tested twice with patients, and questions were reformulated based on provided patient feedback. Involving patients in the development of the interview guide gave us valuable information to optimize the interview guide. The results of this pilot are not included in the analysis. See Appendix 2 for the interview guide.

In addition to the interview data, the following participant characteristics were collected: age, gender, hospital department, admission type (acute/elective), hospital (academic/general), clinical frailty score (CFS) at hospital discharge, hospital length of stay (LOS), ICU LOS, time since hospital discharge and discharge destination (home or (geriatric)rehabilitation facility). The CFS is a well-validated scale used to quantify the degree of disability from frailty (21). The CFS was collapsed into three categories: non-frail (1–4), mild-to-moderately frail (5–6), and severely frail (7–9) (21). The researcher determined the patients' score based on information provided by the patient.

All interviews were audio-recorded and transcribed verbatim. MAXQDA 2022 (VERBI Software, 2021) was used for data analysis. Data were analyzed using thematic analysis, an iterative process of reflexivity in which the researcher's subjective experience is at the center of making sense of the data (22). It contained the following steps:

1) Familiarization with the data: transcripts were thoroughly read and re-read to gain a general understanding of the participants' answers (JvG, MM).

2) Generation of initial codes: meaningful sentences or issues raised by participants were given a general name (JvG, MM, RC).

3) Searching for, defining, and naming theme: the list of codes derived out of step 2 was read and re-read and grouped into categories according to their similarities and characteristics.

The first five transcripts were independently coded (MM, JvG). Codes and themes were compared, after which the coding tree was finalized. A third researcher (RC) was involved in checking categories and themes. Finally, JvG

analyzed the remaining transcripts. Four reflexivity meetings involving at least five members of the research team were held to explore the diversity of patients' perspectives. During these meetings, codes and themes were revised, to make them more comprehensive and clearer. Findings were presented and discussed to increase the richness of data and reduce researcher bias (23). The complete data analysis was conducted in Dutch. The English translations of themes, categories, and quotes were crosschecked and adjusted in a separate meeting with native English speakers.

Demographic data of patients was entered into Statistical Package for the Social Sciences (SPSS) version 21. Categorical data were summarized using frequencies and percentages, and continuous data were analyzed using descriptive statistics in case of not normally distributed data.

Four quality criteria for the trustworthiness were incorporated into the study design (24). Credibility was improved using independent open coding by two researchers and a third researcher involved. Dependability was ensured using member-checking. Participants received the transcript of their interview and were invited to check the transcript (25). To ensure confirmability, probing and prompting questions were used to provide a deeper understanding of participants' answers. To enhance transferability of the data, outcomes were repeatedly discussed within the research team. All members were trained in qualitative research, six research team members had previous experience with conducting qualitative research (JvD/SW/JvG/MM/MvdS/MvdL).

RESULTS

Nineteen interviews were conducted between May 2023 and July 2023. During two interviews, a relative was present to support the participant. A total of 80% (n=15) participants suffered from multiple chronic conditions, all participants received treatment from at least two different allied healthcare professionals during hospital admission. At the moment of hospital discharge, participants had the following CFS, non-frail (32%), mild-to moderately frail (58%) and severely frail (10%). Interviews had a median duration of 35 (IQR 16) minutes. Participants had a median age of 55 (IQR 26) years, and 63% (n=12) were female (Table 1). Of all participants, 79% (n=15) were discharged home after hospitalization. All participants received their transcript for a member check, 10% of the participants provided us with feedback. This feedback did not influence our results. Of all approached participants, two declined to participate in this research, due to not having the time to perform an interview.

Table 1: Demographic information

	Value
Age, median (IQR)	55 (26)
Female, n (%)	12 (63)
Department, n (%)	
ICU	5 (26)
Trauma surgery	4 (21)
Oncologic surgery	4 (21)
Internal medicine	6 (32)
Admission, n (%)	
Acute	5 (26)
Planned	14 (74)
Hospital, n (%)	
Academic	14 (74)
General	5 (26)
CFS, after discharge, n, (%)	
Non-frail (1-4)	6 (32)
Mild – to moderately frail (5-6)	11 (58)
Severely frail (7-9)	2 (10)
Length of stay, days, median (IQR)	15 (27)
Length of ICU stay, days median (IQR)	16 (17)
Time since hospital discharge, months, median (IQR)	7 (9)
Discharge destination, n (%)	
Home	15 (79)
Rehabilitation center	3 (16)
Geriatric rehabilitation center	1 (5)

Abbreviations: IQR= inter quartile range, CFS= clinical frailty scale, ICU= intensive care unit, n= number.

We identified three themes from the data: *"Allied healthcare support during transition", "Patient and family involvement",* and *"Information recall and processing".*

Theme 1: Allied healthcare support during transition

In this theme, participants shared their experiences with allied health professionals who supported them in reaching their rehabilitation goals during the different recovery phases: in-hospital and after hospital discharge. The following three subthemes were identified:

Received support from allied health professionals before discharge

This sub-theme relates to participants' perceptions of how allied health professionals collaborated to support them in the in-hospital phase. During their hospital stay, patients perceived that all (allied) health professionals worked cohesively towards achieving the same goals.

> *"I don't know how they communicate, but I never thought: the physician says one thing and the physical therapist says something else. I never felt as if everyone wanted to go in a different direction [with their therapy]."* (Patient 1, 73 years old)

Furthermore, patients appreciated the continuity of allied health professionals. Being treated by the same therapists was reassuring, as patients knew what to expect and felt safe. However, participants felt that often, professionals acted as if they were not communicating with each other. Indeed, some questions were repeatedly asked, for example questions related to their home situation - which patients perceived as tiring. Nevertheless, participants sometimes noticed that information was exchanged between healthcare professionals, as illustrated by the following quote of a patient whose physical therapy treatments were continued by the nursing staff during evenings or weekends.

> *"Sometimes the nurse fulfilled the role of the physical therapist and sometimes it was the other way around. I didn't have any desire to distinguish between the two."* (Patient 3, 83 years old)

Experiencing such continuity of care resulting from collaboration between professionals was highly valued by the participants. Hence, it was satisfying for patients to work towards rehabilitation goals. Participants further experienced the role of allied health professionals during hospital admission as supportive. Patients greatly appreciated the support provided by their physical therapists, as physical therapy allowed them to actively contribute to their own recovery.

> *"The physical therapist was my last resort to get better. My only goal was to get back to my old self, and my physical therapist helped me a lot with that and got me through it."* (Patient 5, 34 years old)

> *"The physical therapist has a real impact on how you approach every day and how you recover. Yeah. And that's not the impression I get [of the approach] of the doctor."* (Patient 11, 56 years old)

Participants also described experiences with dieticians and speech- and language therapists who, according to them, played more of an advisory role in promoting recovery than physical therapists due to a lower frequency of visits. The fact that dieticians were less frequently seen in patients' rooms than physical therapists sometimes resulted in dissatisfaction and negative experiences with dietary restrictions.

"It took a while for the dietician and me to be on the same page, but eventually I got the tips I needed." (Patient 2, 60 years old)

Finally, participants noticed that an allied health professional's visit was often planned in consultation with a nurse to ensure it would not coincide with the patients' other appointments during the day. Patients perceived this to be positive because it ensured they were rested and had enough energy during the physical therapy appointment.

Received support from allied health professionals after hospital discharge

This sub-theme relates to the phase after hospital discharge. For various reasons, participants generally experienced a smooth hospital-to-home transition and were satisfied with the allied healthcare provided after discharge. After hospital discharge, patients usually experienced difficulties in physical functioning. So, getting in touch with an allied healthcare provider during this phase was essential as they provided patients with the support they needed. This support was experienced if the professionals discussed the rehabilitation goals with the patients. Patients preferred making an appointment with a primary care professional they already knew and trusted, as being treated by a familiar professional was more reassuring than being treated by an unknown person, even if that person was more trained or specialized in the complaint or disease experienced by the patient.

"I was pleased that I [already] knew the physical therapist, she knew how my body works and of earlier things [medical history]. I found that to be very positive." (Patient 5, 34 years old)

"I already talked about it [with the physical therapist] at the hospital: 'just send everything to my physical therapist at home, he knows me, then I will continue it [the treatment] with him." (Patient 2, 60 years old)

Second, participants found the time between hospital discharge and the start of follow-up care in the primary care setting short enough, which was satisfying. They felt that care provision and recovery were not interrupted. Sometimes, patients appreciated having a few days to land at home, after which they had their first appointment with their allied health professional.

"It was nice to be able to land first, at home, to find out: what am I able to do? After that they [the physical therapist] came and that was fine." (Patient 4, 31 years old)

Participants also addressed negative experiences with allied healthcare after discharge. For example, the referral letter from the hospital to the primary care professionals consisted of only one-way communication, meaning that the hospital and primary allied healthcare providers barely had contact with each other.

> *"Really, not one **** is being done [with the referral letter from the hospital], they open it and just continue with their own program anyway."* (Patient 12, 44 years old).

Patients regretted that they had to tell their stories repeatedly to various professionals. It was suggested that physical therapists involved in the aftercare could share information with other allied health professionals involved. According to the patients, poor communication between the hospital and primary care professionals might have delayed their recovery and increased the burden on relatives who supported them.

> *"My [hospital] physical therapist hadn't read the letter of my primary care [physical] therapist. [...] I had told him: 'I'm going to hospital next week' and [he said] I'm going to send them an update. But that didn't seem to happen. So, I very often found that... they had missed each other."* (Patient 11, 56 years old)

Finally, the long waiting lists for treatment from professionals of certain allied health disciplines in primary care made some patients feel that they were offered care too late - after they had already found their own solutions.

> *"By the time I could go to therapy, I had already found my groove."* (Patient 8, 43 years old)

Relying on oneself

This sub-theme relates to the phase after hospital discharge. During this phase, patients indicated to have experienced fear, isolation, and a sense of being a burden to their relatives, for whom the situation felt emotionally and physically heavy. Patients did not want to rely entirely on the help of family members because they were also busy with their daily routines. Therefore, achieving independence was a priority, but patients often missed guidance from allied health professionals on how to recover faster and more efficiently.

> *"It was mainly that I couldn't find my way towards recovery and felt no one was helping."* (Patient 9, 76 years old)

> *"I really missed more direct guidance, being taken by the hand to re-enter the real world."* (Participant 12, 44 years old)

Furthermore, participants experienced barriers to contacting their hospital carers when they had specific questions or felt unwell. They sometimes believed that their problems were not severe enough to warrant calling health professionals at the hospital and feared disturbing them. Therefore, some patients decided to accept the presence of their problems and unanswered questions, sometimes for weeks, until their scheduled appointment with the medical specialist at the hospital. Patients who sought assistance and telephonic communication with their healthcare providers at the hospital sometimes encountered difficulties reaching them, as the administrative personnel answering the phone rebuffed them. This resulted in a feeling of not being taken seriously.

"I was even ready to go to the emergency room. Because there [at the emergency room] I have an entry – they will examine me again. And if I phone them, there is no answer at all." (Patient 5, 34 years old)

Finally, participants mentioned some needs and suggestions which they thought would have been beneficial to them. Receiving a follow-up call from a health professional within six weeks after discharge or having the availability of a telephone number to call in the event of an emergency would be valued. Thereby, they would have valued contact with peers and have a contact person who is available for guiding patients throughout the whole transition process.

Theme 2: Patient and family involvement

Participants explained in which way they were involved in the decision making surrounding the discharge process. The following quote illustrates the experience of a patient who was not feeling ready to be discharged and requested to stay an extra night in the hospital, which was granted. This patient indicated that he/she felt heard, which in turn was reassuring and empowering.

> *"I felt I was entitled to one more night [in the hospital], and I ended up getting it, and that was nice."* (Patient 3, 83 years old)

The moment of discharge seemed sudden and unexpected to some of the participants. In those instances, they felt that they were not ready for discharge, both emotionally and physically, leading to feelings of insecurity.

> *"Well, it was what we wanted, but it all went so fast and there was no build-up or working towards discharge. I got a stack of papers, and they wished me luck and that was that: There's the door."* (Patient 16, 50 years old)

On the contrary, some patients experienced a sudden discharge as a relief since they wanted to go home as soon as possible.

Furthermore, patients and family members highly value the involvement of relatives in the discharge process. First, family members often have a more realistic image of the home environment. They know and can describe the patient's situation and status before hospital admission, which is crucial information for allied health professionals to consider when designing follow-up treatment recommendations. Second, they can assist their loved ones in arranging aftercare, such as acquiring walking aids or procuring medication. Patients emphasized that organizing aftercare was only doable with the help of their families.

> *"My family was really involved, because they would need to help (after discharge) and that was quite nice."* (Patient 4, 31 years old)

Theme 3: Information recall and processing

This last theme pertains to the quantity, clarity, and timing of received information as essential aspects to be considered by allied health professionals to facilitate patient information recall and processing. We identified the following subthemes:

Timing of receiving information and presence of relatives

Information provided on the day of hospital discharge generally did not stick with the patients because their focus was on going home, which required most of their energy and attention. Recalling information provided at this moment is, therefore, challenging. In addition, patients indicated that this information was not always given in the presence of family members, who could have helped them recall it. Not remembering information resulted in feeling lost and not knowing how to self-manage their recovery after arriving home.

> *"I was left, with a lot of questions [when I arrived home]."* (Patient 14, 70 years old)

Quantity and clarity of information

Participants mentioned negative experiences with the amount of information they received, which was sometimes overwhelming or incomplete. The following quote relates to a patient who felt lost in a labyrinth of information and unable to process that amount of information.

> *"Yes, I quickly found it all very confusing, you must arrange everything by yourself. You receive discharge papers for the physical therapist, occupational therapist, but you must make all arrangements by yourself."* (Patient 17, 46 years old)

On top of not receiving the right amount of information, participants felt that the information provided needed to be clarified and adjusted to their level of comprehension. As depicted in this quote, the use of medical or Latin terms by healthcare professionals was negatively perceived:

> *"We are not medically trained, and they use lots of medical terms, so it [the information] should be more in layman's terms."* (Patient 13, 18 years old)

Finally, participants explained that healthcare providers did not check whether the provided information was understood. Again, this led to being left with questions and not knowing how to self-manage at home.

> *"Afterwards [at home], more questions arose because I did have delirium. I was given some information about it, but I kept wondering what you can do about it at home."* (Patient 18, 52 years old)

Finally, participants mentioned they would benefit from clear information about the disease and expected recovery time. They wished to have a checklist that would assist them in arranging aftercare, would clarify what type of aftercare was applicable to them, and how they could arrange it. Additional quotes to support the results section are provided in Appendix 3.

DISCUSSION

This study aimed to gain insight into patients' experiences, perceptions, and needs regarding hospital-to-home transition, focusing on allied healthcare as a first step towards the development of a transitional integrated allied healthcare pathway for patients with complex care needs after hospital admission. The data analysis revealed three themes: *"Allied healthcare support during transition", "Patient and family involvement" and "Information recall and processing".*

The first theme – *Allied healthcare support during transition* – emphasizes the importance of allied health professionals supporting patients in reaching rehabilitation goals. On the one hand, this study depicts positive experiences of participants who felt they could rely on allied health professionals who tailored therapy to their needs, ensured continuity of care, and established a trusting relationship with the participants to reassure them and enhance their recovery. Providing tailored therapy, ensuring continuity of care, and establishing a trusting relationship with patients are essential goals to reach for healthcare professionals as they can improve patient satisfaction, provide a sense of security, and increase adherence to prescribed treatments (26). On the other hand, our study participants encountered negative experiences regarding communication with allied health professionals at the hospital after being discharged home, and poor communication between hospital-based and primary care-based allied health professionals. These communication issues resulted in patients not receiving the support they needed.(11) Poor communication post-discharge has been found to lead to frustration, delayed follow-up, and potentially delayed recovery (27). Effective communication with patients is still not optimal in many settings worldwide (28-30). Therefore, there is a global need to improve the process for transferring information to patients and their primary healthcare providers. Many studies have attempted to address communication issues through various transitional care interventions (28-30). However, these interventions were usually targeting medical needs, nurse-led and primarily involved communication interventions such as follow-up calls. Patients with complex care needs after hospitalization typically require a more comprehensive approach involving several professionals from allied health disciplines, providing integrated care reflecting a more holistic approach. However, such a patient-centered model of care involving hospital and primary care professionals has yet to be developed. To achieve this, recent studies have considered using innovative digital applications, such as mobile apps, which are promising solutions that can enable timely provision of information and support, and empower patients to reach their goals (31). More research

is needed to determine how to integrate these solutions at an organizational and system level (32).

The second theme – *Patient and family involvement* – emphasizes the importance of involving patients and relatives in the discharge process. It highlights that involving patients and relatives in discharge planning can empower patients. In contrast, sudden discharge leads to feelings of uncertainty and insecurity. These findings align with previous studies that found that the information concerning discharge was often provided unexpectedly and without considering patients' preferences (11, 33). A qualitative study on transitional care decision-making from the perspective of older people distinguished two subgroups of patients. The first subgroup did not want to be involved in making decisions related to their care and preferred relying on their formal care providers, whereas the second subgroup felt they were given no choice and that the transitional care decisions were forced upon them (34). Kraun et al., therefore, pointed out that patients have different preferences that must be considered (34). These findings suggest that listening to patient preferences and involving family members is crucial to providing person-centered care. Future research should focus on incorporating these factors and clarifying the role of allied health professionals to enhance the integration and continuation of care during the hospital-to-home transition.

The third theme – *Information recall and processing* – underscores the need for personalized information that is timely and effectively provided and in the presence of family members if possible. Our findings showed that processing or recalling information is often challenging for several reasons. Depending on the patient, information can be overwhelming, and using complicated medical terms can lead to negative feelings such as fear. Each patient has specific needs, and professionals must continually assess them to ensure that they provide comprehensible information at the right moment. Our findings confirmed the findings of previous studies that also emphasized that access to information is an essential element in the transitional decision-making process and that the type of information needed, how it is delivered, and when should be tailored to patients' individual preferences, which is consistent with our results (34-36). Furthermore, it is well established that patient recall is generally very low. Kessels et al. found that, in general, up to 80% of the information given by healthcare professionals was forgotten, and this is confirmed by more recent studies, meaning that finding adequate interventions to address this continues to be a challenge (37, 38). In our study, patients mentioned that involvement of families when providing information would help them recall discharge instructions. Therefore, any future integrated care pathway should

involve relatives during information delivery, although research is needed to determine precisely how this should be done (33).

Strengths and limitations

In this study, we included patients from academic and general hospitals with diverse reasons for hospital admission and discharge destinations. Consequently, our findings regarding allied healthcare needs after hospitalization may apply to a broad population. This wide variation in participants may also affect the validity of our results and it is important for clinicians to consider the needs and desires of the individual patient. While several qualitative studies among hospitalized patients investigating transitional experiences are available, this is the first study focusing on allied healthcare. Furthermore, this study fills a knowledge gap because many studies on transitional care interventions focus on nursing perspectives, and the methodological rigor we applied contributes to the transparency of our results. We did make use of a member check and involved multiple researchers in the analysis process, we could have used more strategies to enhance transferability of the data.

However, there are also limitations to our study. First, we included several vulnerable participants for whom it was sometimes difficult to explain and share experiences due to cognitive and emotional problems related to their hospitalization. Consequently, it was sometimes difficult for patients to specifically recall experiences regarding some critical elements of the discharge process. This could have influenced the accuracy and volume of the memories of the experiences. We aimed to vary the time between hospital discharge and interview within our study population, in order for the recall bias not to be detrimental to our research. Second, patients' knowledge of JvG's association with AUMC might have led those patients who had been admitted to this hospital to provide desirable responses. However, there was no prior relationship between any of the participants and the principal researcher. Third, bias may have occurred due to recruitment strategies. This may have resulted in the selection of very satisfied or very dissatisfied participants. Participants who were recruited via the outpatient clinic or other research projects within the AUMC had outpatient clinic visits before or after hospital admission. Lastly, most participant experiences with allied healthcare concerned physical therapy. The participants shared fewer interactions with dieticians, occupational therapists and speech- and language therapists, while it is possible that they could have benefited from interventions provided by these professionals. This should be considered when designing a transmural

allied healthcare pathway. Nevertheless, we believe the current selection of participants and their experiences are representative of the study population.

CONCLUSION

This study clarifies the experiences, perceptions, and needs of patients with allied healthcare needs in their hospital-to-home transition. Our findings show that hospital and primary care allied health professionals need to continuously collaborate and communicate with each other to provide patients and their families with the personalized support they need. Particular attention should be given to how, when, and what type of information is provided to patients and their relatives to facilitate self-management and active involvement in their recovery process. These findings should be considered when (re)designing an integrated allied health pathway aimed at facilitating communication and adequate information exchange between professionals, patients, and relatives.

Data availability: The data that support the findings of this study are available on request from the corresponding author.

Patient consent statement: All patients participating in this research provided written informed consent.

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APPENDICES

LETTER TO THE EDITOR AND RESPONSE

Following the publication of our article, "*Engaging patients in designing a transmural allied health pathway: A qualitative exploration of hospital-to-home transitions*", we received a Letter to the Editor and responded to this letter. Both the letter and our response are available via the QR codes below.

'Letter to the editor'

'Response'



Chapter 3

Continuity and coordination of care during hospital-to-home transitions: Healthcare professionals' perspectives

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ABSTRACT

Aim

To gain insight into healthcare professionals' perceptions and needs regarding hospital-to-home transitions.

Design

Qualitative phenomenological study.

Methods

Hospital and primary care professionals participated in focus groups and interviews. Participants were recruited from a Dutch University hospital and from our networks between May and September 2023. Data were analyzed using thematic analysis.

Results

We conducted seven focus groups and twelve interviews. Three themes emerged: "Collaboration and information exchange between professionals", "Coordination and continuity of care", and "Interaction between professionals, patients, and families".

Conclusion

This study suggests that professionals would benefit from clear guidelines and arrangements for communication with colleagues to support care coordination and continuity. Collaboration and information sharing are essential for providing integrated, patient-centered care. Additionally, involving patients and families in decision-making regarding hospital-to-home transitions, in a way that considers their needs, is important for effective care.

INTRODUCTION

The aging population and the rising number of patients suffering from more than one disease (i.e., patients that often require care from one or more allied health professionals after discharge), underscores the importance of optimizing current transitional care practices (1, 2). Patients with complex care needs often face fragmented care, marked by a lack of coordination among healthcare providers, especially during transitions from hospital-to-home. This can lead to poorer health outcomes, such as unplanned readmissions. Evidence supports that patients with multiple diseases have a higher risk of unplanned readmissions and hospitalizations (3, 4). These unplanned readmissions contribute to increased healthcare costs. In the Netherlands, for example, 40.9% of all healthcare costs were attributed to unplanned readmissions (5). This underscores the importance of optimizing care coordination during hospital-to-home transitions.

So-called *transitional care interventions* have been developed to ensure effective coordination and continuity of care when patients transition from hospital to home or other destinations. These interventions include – but are not limited to – a combination of triage, discharge planning, involving families, appointing a case manager and follow-up (6). Most of these interventions are unidirectional (i.e., led by nurses or medical doctors who are usually not in contact with primary care). However, many patients require more comprehensive care from multiple (allied) healthcare providers after discharge. Moreover, previous research has shown that current transitional care practices often remain task-oriented despite the imperative for a multidisciplinary and person-centered approach to enhance patient recovery (7, 8). However, sustainably implementing these interventions is challenging due to many individual, organizational, and systemic barriers (9). Examples of such challenges include the coordination of multiple stakeholders across settings, limited hospital bed availability, and insufficient financial resources. Moreover, involving healthcare professionals in designing transitional care interventions may facilitate implementation by addressing context-specific challenges, fostering ownership, and aligning interventions with clinical practices to meet the needs of both patients and professionals (10).

The Study

The objective of this phenomenological study is to gain insight into hospital and primary care professionals' beliefs, thoughts, perceptions, and needs regarding care-coordination during hospital-to-home transitions. By examining their

lived experiences, professionals can provide a deeper understanding of care coordination and continuity. This information can serve as a starting point for (re-) designing an effective transmural care pathway.

METHODS

Design

This study used a descriptive phenomenological approach, based on Husserl's philosophy, to explore healthcare professionals' experiences, perceptions, and needs regarding care coordination and continuity during hospital-to-home transitions (11). Phenomenology can provide a thorough understanding of participants' lived experiences, their meanings, and their implications (12). In this study, phenomenology was used to explore healthcare professionals' experiences with care coordination and continuity, offering nuanced insights into key factors influencing hospital-to-home transitions. Since our research aims to understand how professionals perceive and navigate transitional care, rather than develop a theoretical framework on its processes, we were of the opinion that phenomenology was a more suitable methodological approach compared with other approaches (e.g. grounded theory). The Consolidated Criteria for Reporting Qualitative Research checklist was used to report findings in this study (13).

Study setting and recruitment

Healthcare professionals from a Dutch University hospital and primary care settings were purposefully sampled to participate in separate focus groups and/or in-depth semi-structured interviews. Hospital professionals were recruited through research team members working at the participating wards via email. Primary care professionals were recruited via regional professional allied healthcare networks, social media, and snowball sampling (14). Recruitment continued until thematic saturation was achieved, i.e., when no new themes could be generated from the data.

Inclusion criteria

Healthcare professionals were eligible if they 1) worked as a nurse, transfer nurse, physical therapist, occupational therapist, dietician, speech- and language therapist, medical doctor, practice nurse, or general practitioner, 2) worked in primary care within the Amsterdam region, or 3) worked in the departments of oncologic surgery, internal medicine, trauma surgery, or the

intensive care unit of the participating hospital. These hospital departments were chosen because they include a wide variety of patients with complex care needs, for whom a structured allied healthcare pathway is typically lacking in the Netherlands. Furthermore, we feel that by selecting these four departments a representative sample of healthcare professionals involved in transitional care is provided. Allied healthcare professionals, including physical therapists and dietitians, as well as nurses and medical doctors, were selected because they are responsible for referral and hand-over information in hospital-to-home transitions in the Netherlands. Appendix 1 provides a detailed description of the Dutch healthcare system.

Data collection

The primary data collection method was focus groups, although participants could opt for an interview if scheduling or organizational constraints prevented focus group participation. Data collection took place between May and September 2023. Focus groups were pilot tested once (data not included). Hospital professionals participated in face-to-face focus groups at their respective wards, while semi-structured interviews were conducted online via Microsoft Teams. Focus groups and interviews with primary care professionals were also held online. The topic guide was co-created by members of the research team (SW, JvD, RC, and JvG), who have backgrounds in Clinical Epidemiology (RC), Human Movement Sciences (JvD and SW), and Physiotherapy (RC, JvG, and SW). During the study, questions about professionals' needs regarding handovers were added to the topic guide after the first focus groups revealed their relevance. Each focus group consisted of three discussion rounds. The first round aimed to introduce the topic through a warming-up with general statements participants were invited to react to. During the second round, information was given about the first draft version of the new transmural care pathway, and participants were asked to brainstorm ideas. In the third round, a comprehensive summary of the focus group was provided to highlight the essential elements identified by healthcare professionals. Participants were invited to discuss the summary. A similar topic guide was used for the individual interviews (Appendix 2-4). The focus groups were facilitated by a mediator (JvG), an observer (SW, MM, or JvD), and a moderator who took field notes (RC). Two researchers (JvG and RC) completed a qualitative research course, and all researchers had extensive experience with this type of research. The interviews were conducted by JvG, who was already familiar with some of the participants. In addition to qualitative data,

demographic information was collected, including age, gender, profession, ward, hospital/primary care setting, and years of working experience.

Data analysis

Thematic analysis was applied to identify key themes and provide a structured understanding of their perspectives. (12, 15). All focus groups and interviews were audio-recorded and transcribed verbatim. MAXQDA 2022 (VERBI Software, 2021) was used for data analysis. Data were analyzed using the following three steps (15):

1. Familiarization with the data: transcripts were thoroughly read and re-read to gain a deep understanding of participants' answers. Two researchers (JvG and RC) highlighted meaningful sentences related to care coordination and continuity (i.e., the phenomenon).
2. Generation of initial codes: meaningful sentences or issues relevant to the phenomenon were assigned general codes (JvG, RC, SW, and JvD).
3. Searching for, defining, and naming themes: the list of codes derived from step 2 was reviewed and grouped into categories based on similarities and characteristics. These categories were then synthesized into overarching themes. If needed, a definition of the theme was added.

Two researchers, RC and JvG, independently analyzed the transcripts of the first two focus groups. RC and JvG discussed their codes and themes together. A third researcher (SW) checked the categories and themes to ensure consistency. Finally, JvG analyzed the remaining transcripts. To explore the diversity of healthcare professionals' perspectives on care coordination during hospital-to-home transitions, themes derived from the focus groups and interviews were discussed during five reflexivity meetings. In these meetings, the analysis findings were shared and discussed with the whole research team to reflect on researchers' perspectives, assumptions, and potential biases, thereby enhancing the transparency and trustworthiness of the data analysis process (16). Demographic data was entered into SPSS version 21, where categorical data were analyzed for frequencies, and continuous data were analyzed using descriptive statistics.

Ethical considerations

The AUMC medical ethics committee provided a waiver for this study (METC 2023.0119). All participants provided written informed consent.

Rigor and reflexivity

To ensure transparency in our content analysis, we provide access to our data repository upon request. To ensure the trustworthiness of the qualitative findings, four criteria—credibility, dependability, confirmability, and transferability—were incorporated into the study design (17). Credibility was enhanced through independent open coding by two clinical researchers (RC and JvG) and involving a third researcher (SW and/or JvD) in phases two and three of the analysis. Dependability was ensured via member-checking, where all participants received their focus group or interview transcript and were invited to verify its accuracy (17). Probing and prompting questions were used to clarify and deepen participants' answers to promote confirmability. Finally, transferability was supported by regularly discussing the data analysis outcomes with the research team to ensure consistency and broader applicability.

FINDINGS

Seven focus groups were conducted, four with hospital professionals and three with primary care professionals. On average, six (range 3-9) professionals participated in the focus group. Twelve additional interviews were conducted with hospital professionals (n=8) and primary care professionals (n=4). Participants' mean age was 40 (SD 12) years old, and they had 15 (SD 12) years of working experience in their current profession. Most participants were female (n = 40, 75%). Detailed demographic information is presented in Table 1. Two professionals provided feedback on the member check; this feedback did not influence the results.

Table 1: Baseline characteristics of healthcare professionals

Demographic information	**Total**	**Focus groups**	**Interviews**
Age, years (mean±sd)	40±12	40±12	40±8
Female, n	40	30	10
Setting, n			
Primary care	20	16	4
Hospital	33	25	8
Profession primary care, n			
Physical therapist	7	7	0
Occupational therapist	4	4	0
Dietician	3	3	0
Speech- and language therapist	2	2	0
General practitioner	2	0	2
Practice nurse	2	0	2
Profession hospital, n			
Physical therapist	8	8	0
Occupational therapist	4	4	0
Dietician	4	4	0
Speech- and language therapist	3	2	1
Nurse	6	6	0
Transfer nurse	2	1	1
Medical Doctor	6	0	6
Working experience, years (mean±sd)	15±12	17±12	9±8

Abbreviations: n=number, sd= standard deviation, transfer nurse: nurse who provides information about options such as home care or district nursing, requesting aids or (temporary) placement in a (geriatric) rehabilitation center, practice nurse: a position in general practitioner care in the Netherlands; the support person for the (general practitioner's) practice, There are two specializations: somatic and mental health care.

All focus groups lasted 60 minutes and were multidisciplinary, with at least four different disciplines represented in six of the seven focus groups. The median duration of the individual interviews was 23.59 (IQR 5.01) minutes. We identified one overarching concept 'communication', containing the three following themes: (1) *Collaboration and information exchange between healthcare professionals, (2) Coordination and continuity of care*, and (3) *Interaction between professionals, patients, and families.*

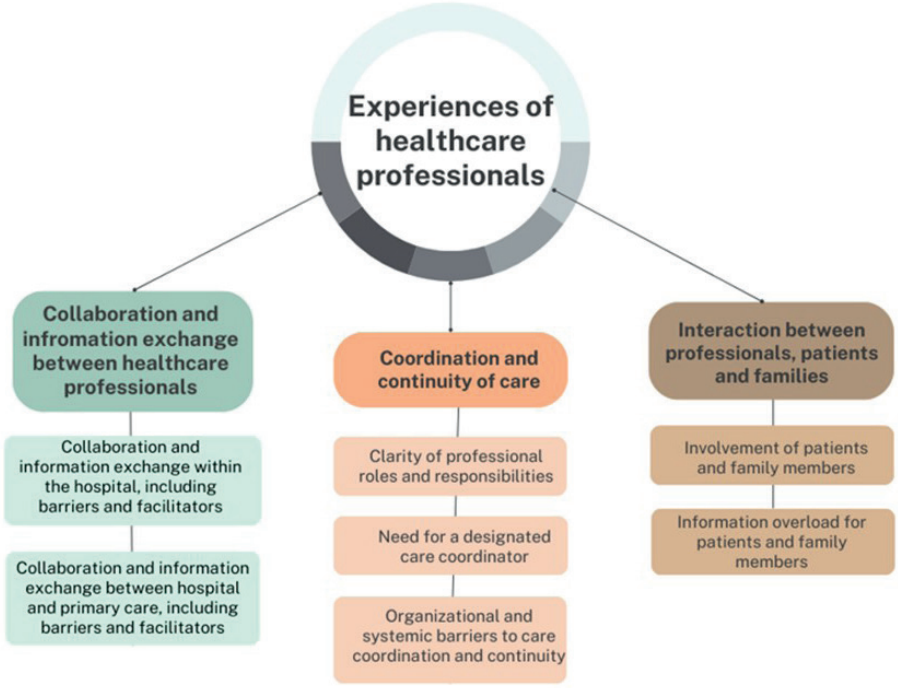


Figure 1: Overview of themes

The main text includes quotes illustrating these themes, with additional quotes provided in Appendix 5. Figure 1 presents an overview of themes and subthemes. Across these themes, hospital and primary care professionals shared positive and negative experiences and perspectives on coordination and continuity of care during hospital-to-home transitions, as well as their views on areas for improvement.

Theme 1: Collaboration and information exchange between health-care professionals

This theme underscores the importance of information exchange during patient transitions from hospital to home. Two subthemes were identified: (1) *Collaboration and information exchange within the hospital, including barriers and facilitators, and (2) Collaboration and information exchange between hospital and primary care professionals, including barriers and facilitators.*

Collaboration and information exchange within the hospital

Hospital professionals reported challenges in timely information exchange among ward colleagues regarding discharge planning. Discharges often feel sudden, leaving professionals and patients insufficiently prepared:

> *"Sometimes I only hear about the discharge after the patient has already left the hospital, then I'm stuck with my back against the wall. If there are still things that need to be arranged for the patient, then that costs me a lot of indirect time (time for which the professional is not always paid)."* (Dietician, hospital)

The inefficient use of electronic patient records exacerbates these issues. Colleagues often fail to read notes, resulting in redundant questioning of patients about their medical history or home situation:

> *"Sometimes the patients say "do you listen or read my (medical) records? Because certain things are asked so often."* (Nurse, hospital)

Furthermore, incomplete information about patients' home situations sometimes delays discharge planning. Hospital professionals indicated that information exchange was more effective with colleagues with whom they had direct relationships.

Barriers and facilitators within the hospital

Healthcare professionals generally experienced good communication and collaboration within hospital wards, facilitated by physical proximity:

> *"Yes, and indeed, there is absolutely no threshold to approach someone. Yes, I actually think we work well together."* (Physical therapist, hospital)

Trust in colleagues' expertise further supported collaboration. This is illustrated by the fact that they prepare themselves for patient visits using each other's notes in the electronic patient records. For example, physical therapists' assessments are pivotal in determining a patient's readiness for discharge:

> *"If it is a challenge to guide the patient in the hospital-to-home transition, then we look at (the information from) the physical therapist. And even more so, we use the reports from the physical therapist to guide the patient (in the hospital-to-home transition)."* (Transfer nurse, hospital)

Collaboration and information exchange between hospital and primary care professionals

Information exchange between hospital and primary care professionals mainly occurs through referral letters, often unidirectional and delivered via patients. Less frequently, professionals call each other. Hospital professionals expressed a need for feedback on the quality and utility of these letters:

> *"I'm also curious about what kind of information my primary care colleague wants (as far as information needed for an optimal hospital-to-home transition)."* (Occupational therapist, hospital)

In the referral letters, primary care professionals reported frequent incomplete or insufficient information about the patient's condition, course of recovery, and next steps to be taken after discharge. Additionally, they felt their responses to hospital colleagues were often disregarded.

> *"I've had it fairly frequently that the discharge letter that I wrote was not even read. The patient sees that it (the discharge letter) just gets pushed aside and that conclusions are drawn without the information I provided. Then I think, yeah, why am I even doing this?"* (Occupational therapist, hospital)

Face-to-face interactions, such as multidisciplinary meetings, were viewed as ideal for exchanging information within professionals' own settings. For cross-setting communication, phone calls or emails were preferred.

> *"It is not commonplace yet, but multidisciplinary meetings should happen more often. It is nice to set up a treatment plan together."* (Occupational therapist, primary care)

Barriers and facilitators between hospital and primary care

Belonging to a network of specialized professionals who regularly communicate with each other was identified as a facilitator for effective collaboration. Such networks facilitate communication between hospital and primary care professionals, patient referrals, and ultimately, the building up of strong interprofessional relationships:

> *"The manner and ease of getting in touch with your colleague from another setting very much depends on the (professional) network within which the patients are referred."* (Physical therapist primary care)

Conversely, professionals' availability and/or accessibility posed significant barriers to effective collaboration and information exchange. Misaligned work schedules and the lack of contact information often hindered timely communication:

> *"Getting a hold of each other is also a challenge because everyone is also just working and treating patients. Sometimes colleagues complain about that when I don't answer. It's always a bit of a search for the best solution."* (Occupational therapist, primary care)

Theme 2: Coordination and continuity of care

This theme highlights the need for effective care coordination and clear delineation of roles and responsibilities in hospital-to-home transitions. We identified three subthemes: (1) *Clarity of professional roles and responsibilities, (2) Need for a designated care coordinator,* and (3) *Organizational and systemic barriers to care coordination and continuity.*

Clarity of professional roles and responsibilities

Hospital and primary care professionals emphasized the lack of clarity regarding who is responsible for organizing patients' discharge and follow-up care. They stressed the importance of understanding which professionals participate in a patient's care:

> *"It's common that you don't know (who is involved with the patient); you depend on what the patient tells you. And sometimes, I'm busy for over an hour looking through medical records for the names of professionals involved. It is helpful information to know (who is involved)."* (General practitioner, primary care)

While no formal agreement exists, many hospital professionals believed that nurses should take the lead in facilitating communication among ward professionals due to their close interaction with patients:

> *"The nurses keep a very good record of their situations in the patients' files. They see the patient lying in front of them and have an impression of, "Oh, that patient can go home or that one can't", and then they note it down."* (Physical therapist, hospital)

Allied health professionals reported relying on nurses to compile and communicate to the rest of the team all information that is needed to prepare

patients for discharge, such as treatment plans. Medical doctors retain responsibility for final discharge decisions, such as the moment and destination of discharge:

> *"I feel that a portion of that responsibility (of the timing and planning of discharge) lies with the physician in charge; I believe they are the boss."* (Physical therapist, hospital)

Hospital professionals also considered it their duty to assist patients with post-discharge preparations, such as acquiring assistive devices:

> *"If someone can't arrange something, then I do that with the computer at their bedside. If they can arrange it themselves, then I let them do it. That is a part of the treatment I give."* (Physical therapist, hospital)

Finally, a lack of shared expectations among professionals was identified as a barrier to effective communication, with primary care professionals reporting that understanding hospital therapists' recovery expectations could guide when to contact them:

> *"Expectations from hospital colleagues are necessary to get in contact (with them). If you know their expectations, for example, about the patient's status at discharge, you know when it doesn't go as it should. And then we know when to contact the hospital colleagues."* (Physical therapist, primary care)

Need for a designated care coordinator

Professionals expressed a strong need for a coordinator to oversee hospital-to-home transitions. This coordinator should have a comprehensive understanding of patients' needs, facilitate communication between professionals, and organize follow-up care. Hospital professionals suggested that the transfer nurse could fulfill this role, while a primary care physical therapist believed that this role would suit physical therapists well:

> *"We have a role in screening how it is going (with the patient's recovery), so if it is not going well, for example, before the patient goes to a follow-up appointment, then I sound the alarm. And (also) if I think other sorts of care are needed."* (Physical therapist, primary care)

The designated coordinator would not need to provide direct medical care but should connect relevant professionals and streamline communication.

> *"It is very important to have a regular contact person you can reach quickly and who makes communication (between organizations) easier; even if it is not the person you need to talk to, this contact should be able to forward you to the person you need to speak with."* (Physical therapist, primary care)

Lastly, primary care professionals particularly valued the involvement of home nursing care services, as these providers regularly assess patients and refer them to appropriate allied health professionals.

Organizational and systemic barriers to care coordination and continuity

Hospital and primary care professionals identified several organizational and systemic barriers to effective care coordination and continuity. While recognizing the importance of multidisciplinary collaboration within and between organizations, they acknowledged it was not always prioritized:

> *"The follow-up care clearly does not hold the same priority for everyone; engaging everyone in the department and maintaining a sense of proactiveness is a challenge."* (Medical doctor, hospital)

Participants expressed frustration over the lack of standardized guidelines for communication and referral processes:

> *"The discharge letter shouldn't be that way: I do it in my manner, and you do it in your manner. It would be great if that's possible (a uniform way of referring patients) because we are not there yet."* (Medical doctor, hospital)

Primary care professionals also indicated they face challenges in maintaining continuity of care due to high turnover rates among general practitioners, who play a pivotal role in care coordination after discharge:

> *"By the time I get my hands on one (a general practitioner), they're gone the following week. So that makes it difficult—an extra bump to have a good consultation."* (Physical therapist, primary care)

Systemic barriers reported by professionals included the lack of financial support for interprofessional communication, which is not covered by health insurance. Professionals often perform these tasks outside regular hours, compromising their patient contact time:

> *"We have to work together but it's not getting paid."* (Physical therapist, primary care)

Theme 3: Interaction between professionals, patients, and families

This theme refers to the efficient involvement of patients and their family members as collaborators to optimize the hospital-to-home transition process. We identified two sub-themes: (1) *Involvement of patients and family members* and *(2) Information overload for patients and family members*.

Involvement of patients and family members

Hospital professionals emphasized the importance of involving patients and their families from the start of the hospital-to-home transition process. Timely and clear communication about discharge planning enables patients and families to ask questions and prepare for post-discharge care:

> *"While you sit down (with the patient) and announce that you will talk about discharge, and you go through everything, it is much clearer."* (Medical doctor, hospital)

However, hospital professionals mentioned that the extent of patient and family involvement should be balanced to avoid overburdening the healthcare team:

> *"When it takes more time (involving patients and families in the hospital-to-home transition), yes, I think there will be resistance (from healthcare professionals on the ward), and more barriers will be raised. So, I think that's a good thing to keep in mind."* (Medical doctor, hospital)

Information overload for patients and family members

Both hospital and primary care professionals highlighted that the volume of information provided to patients at discharge often overwhelms them and does not seem to "stick" in their memory. This might result in delayed physical recovery, for instance, when patients forget that they were instructed to make a follow-up appointment with a particular primary care professional or misplace the referral letter:

> *"The communication (between hospital and primary care) goes via the patient, and the question is if that is actually good because the patient is not always adequate (to report medical information correctly to a healthcare professional)."* (Nurse, hospital)

Healthcare professionals further explained that patients are typically provided with large volumes of paperwork during their hospital stay, which can confuse

them. Despite this, printed handover information remains essential to remind patients of essential steps for optimal recovery, such as scheduling follow-up care. Moreover, professionals highlighted the issue of poorly timed discharge communication. Sudden discharges often leave patients and families feeling unprepared:

> *"Sometimes you feel like there's a shortage of beds in the hospital and that you "oops" get a surprise patient dumped on your plate, and then I think, wow, they are not prepared! But other times everything is arranged, it varies a lot!"* (General practitioner, primary care)

DISCUSSION

This study explored the beliefs, perceptions, and needs of healthcare professionals in hospitals and primary care regarding coordination and continuity of care during hospital-to-home transitions. Three themes were identified: *"Collaboration and information exchange between healthcare professionals", "Coordination and continuity of care",* and *"Interaction between professionals, patients, and families".* Considering these themes might be helpful when (re)designing a patient-centered, multidisciplinary transitional care intervention aimed at facilitating coordination, collaboration, and adequate information exchange between professionals, patients, and their families. All the identified themes were ultimately connected to communication; therefore, in the subsequent discussion, we reflected on the topic of communication in each theme.

The first theme – *information exchange between healthcare professionals* – illustrates the challenges healthcare professionals face regarding information exchange. Within the hospital, discharge information is not always communicated to all professionals timely, sometimes resulting in delayed discharge. Between hospital and primary care, information exchange remains predominantly unidirectional. A recent systematic review that investigated handover challenges concerning safety and quality of health services corroborates our findings, as they identified a lack of communication as the main cause of reduced safety and quality of care (18). Additional challenges they identified included the absence of a discharge checklist, lack of coordination, and poor task-, space- and time management–several of which align with our findings (18). According to our results, primary care professionals often find the discharge letters unclear, while hospital professionals report hardly ever receiving questions about or feedback on their discharge letters. This indicates

a misalignment among healthcare professionals across settings. Moreover, our finding that hospital professionals value knowing (how to find) their primary care counterparts responsible for follow-up care aligns with findings from a previous study (19). This study, exploring healthcare professionals' perceptions, highlighted that safe care transitions not only rely on knowing the patient well but also on strong interprofessional relationships across teams and settings (19).

Theme 2 – *Coordination and continuity of care* – illustrates the need for clear role definitions among healthcare professionals. Our study revealed a lack of standardized procedures for establishing contact with colleagues across different care settings, as well as limited time during work hours to plan (inter)organizational communication. These gaps often lead to insufficient communication about patients' rehabilitation plans, which might negatively impact hospital-to-home transitions. Healthcare professionals reported being unaware of each other's expectations regarding discharge letters, as well as who engages in the patient's care or who assumes responsibility during the hospital-to-home transition. Thus, lack of clarity hinders multi-professional collaboration. To address these issues, our participants suggested appointing a designated case coordinator to oversee the hospital-to-home transition. Supporting this approach, a recent review identified essential strategies for effective case management, including creating personalized care plans and enhanced communication within multidisciplinary teams across diverse care settings (20). Further research should focus on multi-professional communication to collaborate more effectively with each other and increase knowledge of each other's roles (i.e., how, what, and when to communicate).

Theme 3 – *Interaction between professionals, patients, and families* – illustrates the importance of efficiently involving patients and families. Surprisingly results revealed a discrepancy in the perspectives of hospital and primary care professionals: primary care professionals rarely mentioned patient and family involvement during the focus groups or interviews, whereas hospital professionals emphasized the importance of involving patients and family members. This difference can be explained by the fact that patients' home situations are vital information in making a treatment plan for hospital professionals, while primary care professionals focus more on improving mobility, which may necessitate less family involvement. Furthermore, a challenge we identified was the loss of essential information during patient discharge. This finding aligns with several prior studies reporting that the information provided can be overwhelming for patients and often poorly timed (21-23). Engagement of patients and family members was found to be

one of the essential components of effective hospital-to-home transitions in a previous study (24).

Strengths and limitations

This study included a diverse sample of 53 healthcare professionals with varied expertise, including allied healthcare professionals, nurse practitioners, and physicians from both hospital and primary care settings. The additional interviews we performed after the focus groups provided more in-depth information and thematical saturation was reached. Consequently, our findings regarding allied health needs in the hospital-to-home transition may apply to a broad population. This study is conducted with methodological rigor contributing to our results' transparency. However, there are also limitations to our study. First, all hospital healthcare professionals who participated in this study worked in an academic hospital; no conclusions can be drawn from general hospital professionals, affecting our results' generalizability. Second, the composition of our sample may influence the breadth of perspectives on hospital-to-home transitions, as dietitians have different levels of involvement in care transitions compared to, for example, nurses and medical doctors. This should be considered when interpreting the results in other healthcare contexts. Third, most information was collected from hospital- and primary care physical therapists. Less is collected from professionals from other allied health disciplines; this could be due to our recruitment strategy and may have resulted in unbalanced results. Physical therapists occupy a large share of the Dutch healthcare system. To provide perspective, in 2023, 36.166 physical therapists and 5.250 dieticians were registered in the Netherlands (25, 26).

Recommendations for further research

Future research should focus on translating and implementing our findings into the daily practices of hospital and primary care professionals. One area for investigation is the use of digital communication tools to enhance handovers between healthcare professionals. Research could also explore the effectiveness of uniform templates for handovers, as research suggests that they have the potential to improve consistency and clarity in communication (27-29). Next to that, the integration of a case coordinator into daily practice could be explored as a possible means to avoid placing extra time demands on healthcare professionals or increasing costs for healthcare organizations (30, 31)

Implications for policy and practice

The three themes are interconnected, with improvements in one area positively impacting the others. For instance, enhancing communication in information exchange (Theme 1) can lead to more effective coordination of care (Theme 2), because more accurate information allows professionals to align their actions. This, in turn, improves interactions between professionals, patients, and families (Theme 3). By addressing each of these themes, the overall quality of hospital-to-home transitions can be significantly improved.

Optimizing collaboration between patients, families, and healthcare professionals can be achieved through strategies like regular multidisciplinary meetings, structured family involvement in care planning, and tailored communication tools (e.g., shared decision-making aids, care diaries). Additionally, digital communication tools could further improve collaboration by enabling seamless information sharing across hospital and primary care settings (28, 32). Moreover, our findings support the coordination of referrals within specialized care networks (21). These strategies promote clear communication and ensure that all stakeholders are involved in the care plan.

CONCLUSION

This study aimed to gain insight into healthcare professionals' thoughts, beliefs, perceptions, and needs regarding hospital-to-home transitions. The findings suggest that future hospital-to-home transitions could be improved by optimizing interprofessional communication (e.g., multidisciplinary, and interactive communication that comprehends more than a one-way handover). Moreover, more clarity is needed for healthcare professionals regarding the question of 'who does what?' during hospital-to-home transitions and information should be presented in a way that is comprehensible for patients and families.

Data availability: The data that support the findings of this study are available on request via DataVerseNL: https://doi.org/10.34894/GBGDDL

Informed consent: Written informed consent was obtained from all participants.

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APPENDICES





Chapter 4

Experiences with hospital-to-home transitions: perspectives from patients, family members and healthcare professionals. A systematic review and meta-synthesis of qualitative studies

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ABSTRACT

Purpose

Multiple studies have explored the needs and experiences of patients, family members, and healthcare professionals regarding hospital-to-home transitions. Our study aimed to identify, critically appraise, and summarize these studies in qualitative meta-synthesis.

Materials and methods

Medline, CINAHL and Embase were systematically searched to identify eligible articles from inception to June 2024. Qualitative studies were included and critically appraised using the Critical Appraisal Skills Program. Insufficient-quality papers were excluded. We performed a meta-synthesis following 1) open coding by two independent researchers and 2) discussing codes during reflexivity meetings.

Results

Ninety-eight studies were appraised, of which 53 were included. We reached thematic saturation, four themes were constructed: 1) *care coordination and continuity, 2) communication, 3) patient and family involvement,* and 4) *individualized support and information exchange.* For patients and families, tailored information and support are prerequisites for a seamless transition and an optimal recovery trajectory after hospital discharge. It is imperative that healthcare professionals communicate effectively within and across care settings to ensure multidisciplinary collaboration and care continuity.

Conclusions

This study identifies essential elements of optimal transitional care. These findings could be supportive to researchers and healthcare professionals when (re)designing transitional care interventions to ensure care continuity after hospital discharge.

INTRODUCTION

Over the past 20 years, global healthcare has changed due to the aging of the population and the increasing prevalence of multimorbidity (1). In the Netherlands, for example, about 5.7 million people were diagnosed with two or more chronic conditions in 2021 (2). In the meantime, the average hospital length of stay for each admission has been steadily decreasing from eight to five days in 2022, among countries belonging to the Organization for Economic Cooperation and Development countries, for reasons of curbing healthcare costs (3). A shorter hospital stay generally results in patients being discharged while still needing follow-up care. Careful coordination between hospital- and primary care providers is therefore needed to ensure continuity of care and optimal recovery. In the past, transitional care interventions have been developed to ensure the coordination and continuity of care across various locations or levels of care (4). These interventions, which were historically often monodisciplinary in nature, focused mainly on medical care needs, such as medication adherence and were found to reduce hospital readmission rates and improve patient outcomes (5-7). With the expected increased complexity of patients' follow-up care needs, such monodisciplinary interventions may no longer be sufficient (8, 9).

Ensuring continuity and quality of care for patients with complex care needs requires a more holistic approach to transitional care by a range of healthcare professionals. This means providing not only medical care but also care provided by allied health professionals such as physical therapists, occupational therapists, dieticians, and/or speech and language therapists (8). The Commonwealth Fund International Health Policy reported that up to 35% of patients in high-income countries encounter difficulties with care coordination after discharge. These issues may arise from situations where professionals responsible for follow-up care are not being provided with patients' medical histories or receive conflicting information, which may, in turn, delay patient recovery (10, 11). Hence, transitional care interventions are required to provide patients with a seamless hospital-to-home transition and continuity of care by optimizing collaboration between hospital and primary care professionals.

In past years, many qualitative studies have investigated the needs and experiences of patients, family members, and healthcare professionals regarding continuity and coordination of care during hospital-to-home transitions. These studies generally investigated specific patient or professional populations or patients' experiences with certain aspects of the transition (12, 13) As valuable lessons can be learned from these individual studies regarding

optimizing hospital-to-home transitions, conducting a meta-synthesis of qualitative studies on this topic can provide a comprehensive overview and understanding of patient and (allied) health professional needs regarding this sensitive moment in the recovery phase after hospital admission.

Therefore, this study aimed to identify and critically appraise the current body of qualitative evidence investigating patients', family members', and (allied health) professionals' experiences and needs, surrounding care continuity during and after the transition from hospital to home. An overarching synthesis is provided of high-quality study results with recommendations for transitional care interventions.

MATERIALS AND METHODS

The protocol for this systematic review was registered in Prospero (CRD42023421423). This study adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and ENTREQ. Figure 1 presents the design of this meta-synthesis.

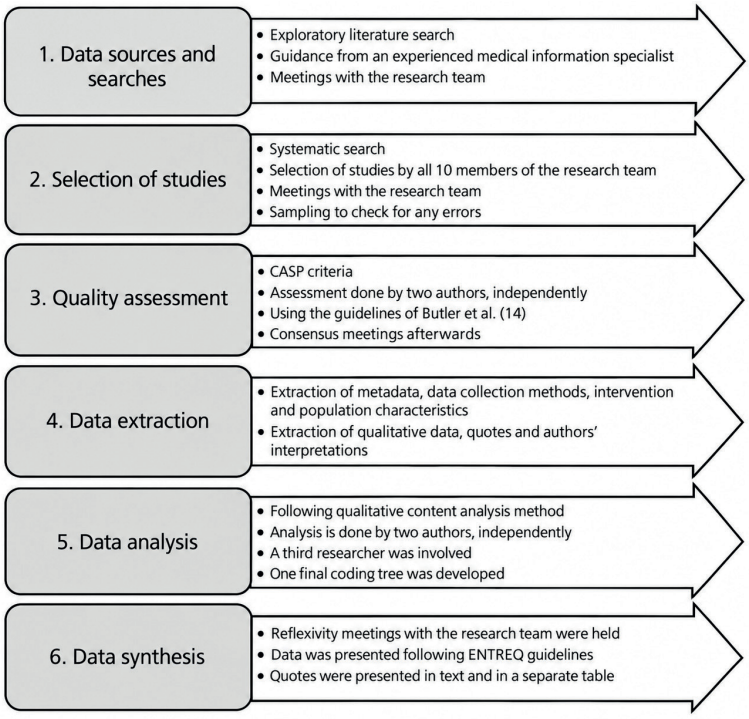


Figure 1: Overview of the steps conducted in this meta-synthesis.

Data sources and searches

Qualitative or mixed-method studies using qualitative data collection methods, such as semi-structured interviews or focus groups, were eligible for review. Electronic searches in Medline, CINAHL and Embase were conducted from inception until June 2024. Additional records were identified through the snowball method using Google Scholar (14). An experienced medical information specialist conducted the search (Appendix 1).

Selection of studies

Studies were eligible if they: 1) applied qualitative data collection methods, such as semi-structured interviews and/or focus groups, 2) included adult patients, informal carers, and/or healthcare professionals, and 3) focused on experiences around the hospital-to-home transition and/or experiences with transitional care interventions. Studies investigating experiences with mono-disciplinary transitional care interventions (e.g., telephone calls by a nurse practitioner) were excluded. For patients with complex care needs, transitional care interventions generally require a multidimensional approach leading to the exclusion of studies on single, monodisciplinary care interventions. Also, studies focusing on populations suffering from singular psychological issues or requiring palliative care were excluded, as for these populations, transitional care experiences are expected to be different. Retrieved records were imported into Rayyan (http://rayyan.qcri.org). Title and abstract screening was conducted in two stages: 1) after duplicate removal, titles and abstracts were initially screened (by one reviewer) to filter out articles that did not answer the research question (e.g., studies focusing on medication interventions) and 2) titles and abstracts of the remaining potentially eligible articles were then re-screened by two reviewers independently. Next, full texts were assessed for eligibility by two reviewers (JvG and RC). Disagreements between reviewers were resolved during a consensus meeting.

Quality assessment

Each article was independently assessed by two researchers (JvG and RC) using the Critical Appraisal Skills Program checklist for qualitative research (CASP) (15, 16). The CASP checklist consists of 10 items assessing the credibility of the evidence. Butler et al. recommended that qualitative systematic reviews rely on well-planned, peer-reviewed protocols for trustworthy and clinically useful results. Articles lacking a statement on ethical approval were excluded (item nr. 7=0.0), as were those with a sum score < 6.0 (16). Finally, the papers were

categorized into high-quality (score 9.0–10.0), moderate-quality (score 7.5–9.0), and fair-quality (score 6.0-7.5).

Data extraction

The following data were extracted: author, year, country, aim, patient population (i.e., older, cardiac, stroke patients etc.), occupation of professional interviewees (nurse, allied healthcare professional etc.), care setting of the professional interviewees (primary care, community care, rehabilitation center, hospital etc.), demographics, design and data collection method and qualitative outcomes (quotes and authors' interpretative analysis).

Data analysis and synthesis

We used qualitative content analysis to analyze the data and followed the Enhancing Transparency of Reporting the Synthesis of Qualitative Research (ENTREQ) statement (17, 18). JvG and RC thoroughly read all included papers. First-order constructs (direct quotes of participants) and second-order constructs (study authors' interpretations) relevant to the aim of this meta-synthesis were imported into MAXQDA 2022 (VERBI Software, 2021) (19). JvG and RC independently coded first, and second-order constructs of two qualitative studies, and codes were compared to ensure consistency in the analysis, after which each author individually coded half of the remaining papers. Throughout the analysis, JvG and RC met after each five studies to discuss new constructed codes. Once the final list of codes was developed by the researchers, the two coders grouped conceptually similar constructs from the different papers to identify categories with a third researcher (MM). To improve the quality and rigour of the study, the results were discussed during several reflexivity meetings involving members of the research team (JvG, RC, MM, SW, JvD, EG, MvdL) (20). These meetings were pragmatic, gave structure to an inductive method of analysis, and led to the final themes and codes. In these meetings, we discussed when the point of thematic saturation was reached, i.e., when no new themes could be constructed from the set of codes. As a last step, categories were developed to produce third-order constructs (views and interpretations of our research team) expressed as higher-order themes and subthemes. We performed a secondary analysis to provide insight in the distribution of the results per country to assess heterogeneity and external validity of our results (Appendix 2).

RESULTS

After duplicate removal, titles and abstracts of the remaining records (n=36117) were screened for eligibility, leaving 1175 studies meeting the inclusion criteria (Figure 2 PRISMA flowchart). A total of 1098 records were excluded based on screening on full text, 77 records remained. Twenty-one additional papers were identified through a snowball search. Ninety-eight articles were appraised, after which 45 articles were excluded. Reasons for exclusion were CASP<6.0 or CASP item 7=0 (n=20, 44%), not addressing the research question (n=8, 18%), incorrect design and/or population (n=14, 31%), and full-text missing (n=3, 7%). Finally, 53 studies were included of which 39 (74%) investigated experiences, perceptions, or needs regarding hospital-to-home transitions from patients', family caregivers', or healthcare professionals' perspectives, and fourteen studies (26%) investigated (experiences with) specific multidimensional transitional care interventions. Results are presented following the ENTREQ guideline.

Study and population characteristics

We included studies published between 2007 and 2024 representing populations of fourteen countries, the majority of which were published in the United States (n=10, 19%), the United Kingdom (n=8, 16%), and Australia (n=9, 18%). The following patient populations were included in the studies: older patients (n=23), surgical patients (n=9), cardiac patients (n=3), stroke patients (n=2), diabetic patients (n=2) and other/not specified (n=14). Twenty-nine (55%) studies investigated the perspectives of patients and family caregivers, and sixteen (30%) explored healthcare professionals' perspectives. Eight studies (15%) explored the combined perspectives of patients, family caregivers, and healthcare professionals. A detailed overview of the study and population characteristics can be found in Appendix 1.

Quality appraisal results

Nine (17%) studies were of high quality (21-28), 24 (45%) of moderate quality (28-55), and 20 (38%) of fair quality (56-73) (Table 1). Studies ranked as being of moderate- or fair methodological quality scored lower because they either did not report the relationship between the researcher and the participants, lacked details on the rigor of data analysis, and/or lacked information on the added value of the research was.

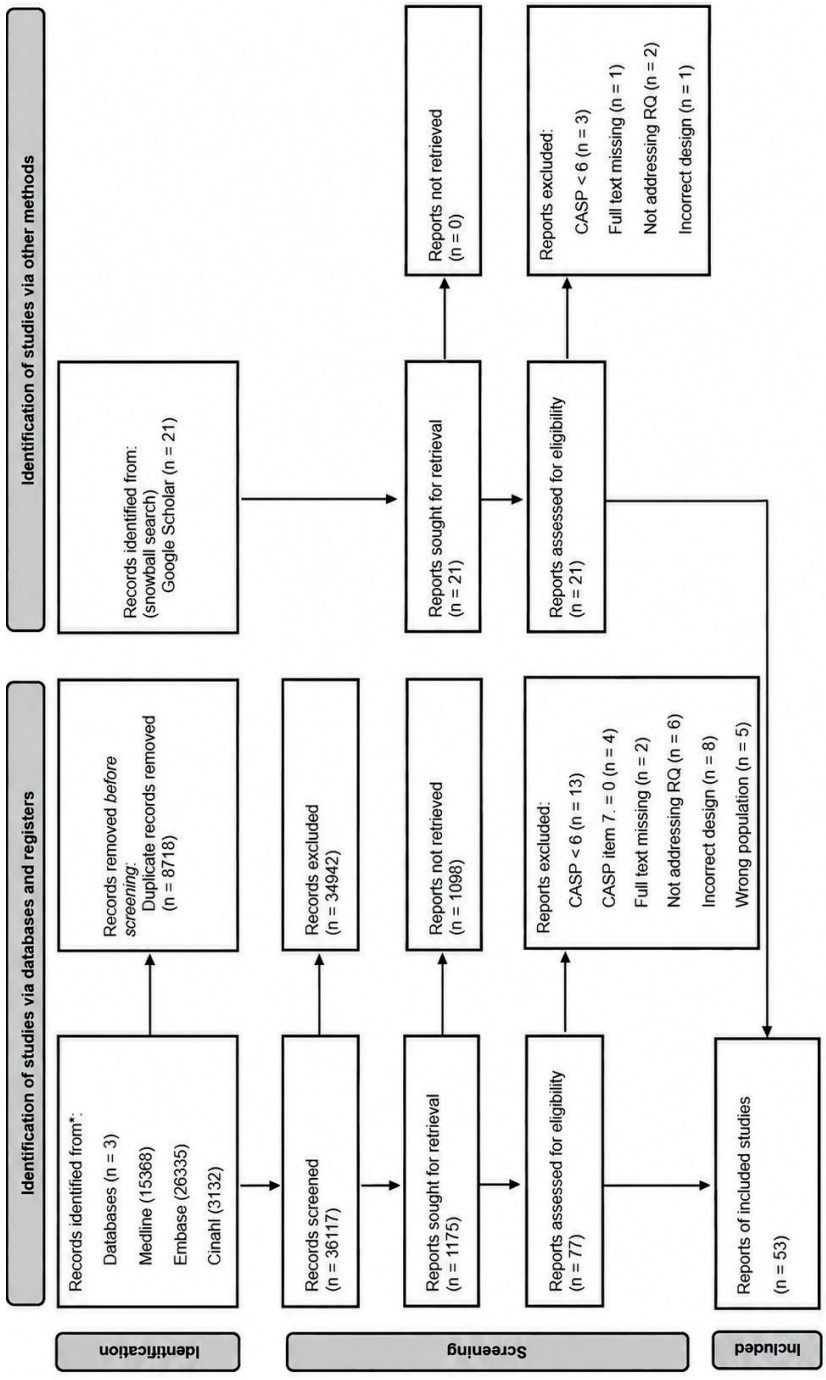


Figure 2: PRISMA flowchart selection process for qualitative meta synthesis.
Abbreviations: CASP= Critical Appraisal Skills Program checklist for qualitative research

Table 1: Quality appraisal

First authors' last name	Year	CASP items										Total score	Category	Reason for exclusion
		1	2	3	4	5	6	7	8	9	10			
Allen	2020	1.0	1.0	0.5	0.5	1.0	0.5	1.0	0.0	1.0	1.0	7.5	Moderate	
Allen	2018	1.0	1.0	1.0	1.0	1.0	0.0	1.0	0.5	1.0	0.5	7.5	Moderate	
Agerholm	2023	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	0.5	1.0	8	Moderate	
Allen	2022	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.5	1.0	1.0	9	High	
Allen	2022	1.0	1.0	1.0	0.5	1.0	0.5	1.0	0.5	1.0	1.0	8.5	Moderate	
Antony	2018	1.0	1.0	0.5	0.5	1.0	0.5	1.0	0	1.0	0.5	7	Fair	
Arora	2010	1.0	1.0	0.5	0.5	0.0	1.0	1.0	0.5	0.5	0.0	6	Fair	
Ayele	2019							0.0					Exclude	Nr. 7=0
Backman	2018	1.0	1.0	1.0	0.5	0.5	0.5	1.0	0.5	1.0	0.0	7	Fair	
Baxter	2020	1.0	1.0	1.0	0.5	1.0	0.5	1.0	0.5	1.0	0.5	8	Moderate	
Brez	2009	1.0	1.0	1.0	1.0	0.5	1.0	1.0	0.0	1.0	0.5	8	Moderate	
Brooke	2018	1.0	1.0	1.0	0.5	1.0	0.0	1.0	0.5	1.0	1.0	8	Moderate	
Crawshaw	2021	1.0	1.0	0.0	1.0	1.0	0.0	1.0	1.0	1.0	0.5	7.5	Moderate	
Clair	2017	0.5	1.0	0.0	1.0	0.5	1.0	1.0	0.0	0.5	0.0	5.5	Exclude	<6.0
Cobley	2013	1.0	1.0	0.5	0.5	1.0	0.0	1.0	1.0	1.0	0.5	7.5	Moderate	
Coleman	2015	1.0	1.0	0.5	0.5	0.5	0.0	1.0	0.0	0.0	0.5	5	Exclude	<6.0
Davis	2012	0.5	1.0	0.5	0.5	1.0	0.5	1.0	0.5	1.0	0.0	6.5	Fair	
de Vos	2017	1.0	1.0	1.0	0.5	0.5	0.0	1.0	0.0	0.0	0.5	5.5	Exclude	<6.0
Devriendt	2013	1.0	0.5	0.0	0.5	0.5	0.0	1.0	0.0	0.5	0.5	4.5	Exclude	<6.0
Domu	2021	1.0	1.0	1.0	0.0	1.0	0.5	1.0	0.0	1.0	0.5	5.5	Exclude	<6.0
Doos	2015	1.0	1.0	1.0	1.0	1.0	0.0	1.0	0.5	0.5	0.5	7.5	Moderate	
Dow, B	2007	1.0	0.5	0.0	1.0	0.5	0.0	1.0	0.0	1.0	0.5	5.5	Exclude	<6.0
Dutton	2014	1.0	1.0	0.5	0.5	0.5	0.0	1.0	0.5	1.0	0.5	6.5	Fair	
Fox	2023	1.0	1.0	0.0	1.0	0.5	0.0	1.0	0.5	1.0	0.5	6.5	Fair	
Gotlib	2018							0.0					Exclude	Nr. 7=0
Graham	2009							0.0					Exclude	Nr. 7=0
Greysen	2014	1.0	1.0	0.5	0.5	0.5	0.0	1.0	0.0	1.0	0.0	5.5	Exclude	<6.0

First authors' last name	Year	CASP items										Total score	Category	Reason for exclusion
		1	2	3	4	5	6	7	8	9	10			
Groene	2012	1.0	1.0	0.0	0.5	1.0	0.0	1.0	1.0	0.5	0.5	6.5	Fair	
Grootel	2024	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	9.0	High	
Guassora	2015	0.5	1.0	1.0	0.5	0.0	0.0	1.0	0.5	1.0	0.0	5.5	Exclude	<6.0
Gustafsson	2013	1.0	0.5	1.0	1.0	0.5	0.0	1.0	0.5	1.0	1.0	7.5	Moderate	
Guzman	2022	1.0	1.0	0.0	0.5	0.5	0.0	1.0	0.0	1.0	0.5	5.5	Exclude	<6.0
Hansson	2018	1.0	1.0	0.5	0.5	0.5	0.0	1.0	0.0	0.5	0.5	5.5	Exclude	<6.0
Harvey	2017	1.0	1.0	1.0	1.0	0.5	0.0	1.0	0.5	1.0	0.0	7	Fair	
Humphries	2019	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	0.5	8.5	Moderate	
Jepma	2021	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	9.5	Moderate	
Jones	2015	1.0	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0	0.5	8	Moderate	
Kable	2015	1.0	1.0	0.5	1.0	0.5	0.0	1.0	0.0	1.0	0.5	6.5	Fair	
Kangovi	2014	1.0	1.0	0.5	1.0	1.0	0.5	1.0	0.5	1.0	1.0	8.5	Moderate	
Kelly	2016	1.0	1.0	0.5	1.0	1.0	0.0	1.0	1.0	1.0	0.0	7.5	Moderate	
Kimmel	2016	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.0	1.0	0.5	8	Moderate	
King	2022	1.0	1.0	1.0	0.5	1.0	0.0	1.0	1.0	1.0	1.0	8.5	Moderate	
Kokorelias	2023	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	10	High	
Kokorelias	2023	1.0	1.0	0.5	1.0	1.0	0.5	1.0	1.0	1.0	1.0	9	High	
Lilleheie	2020	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	9	High	
Lou	2016	1.0	1.0	0.5	0.5	1.0	0.0	1.0	1.0	1.0	1.0	8	Moderate	
Major	2021	1.0	1.0	0.5	1.0	0.0	0.0	1.0	0.0	1.0	0.5	6	Fair	
Major	2019	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	9	High	
Maximos	2024	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	0.5	9	High	
McFadden	2022	1.0	1.0	0.0	1.0	0.5	0.0	1.0	0.0	0.5	1.0	6	Fair	
Muhamad	2022	1.0	1.0	0.5	0.0	0.5	0.0	1.0	0.0	0.5	0.0	4.5	Exclude	<6.0
Naylor	2009	1.0	1.0	0.5	0.5	0.0	0.5	1.0	0.0	0.0	0.0	4.5	Exclude	<6.0
Nissim	2014	1.0	1.0	0.5	0.5	1.0	0.5	1.0	0.0	0.5	0.5	6.5	Fair	
Oravec	2022	1.0	1.0	0.5	1.0	1.0	0.0	1.0	0.5	1.0	1.0	8	Moderate	
O'neill	2024	1.0	1.0	0.0	0.5	0.5	0.0	1.0	0.0	0.5	0.0	4.5	Exclude	<6.0

First authors' last name	Year	CASP items										Total score	Category	Reason for exclusion
		1	2	3	4	5	6	7	8	9	10			
Park	2022	1.0	1.0	0.5	0.5	1.0	0.0	1.0	0.0	0.5	0.5	6	Fair	
Persson	2022	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	0.5	9	High	
Petersen	2019	1.0	1.0	1.0	0.0	0.5	0.5	1.0	0.5	0.5	0.5	6.5	Fair	
Prinjha	2009	1.0	1.0	0.5	0.5	0.5	0.0	1.0	0.0	0.5	1.0	6	Fair	
Rupa	2022	1.0	1.0	0.0	0.0	1.0	0.0	1.0	0.5	0.5	0.0	5	Exclude	<6.0
Rustad	2016	1.0	1.0	0.5	1.0	1.0	0.0	1.0	1.0	1.0	0.5	8	Moderate	
Sandlund	2024	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0	9	High	
Shannon	2022	1.0	1.0	0.5	1.0	1.0	0.5	1.0	0.5	1.0	1.0	8.5	Moderate	
Slager	2017							0.0					Exclude	Nr. 7=0
Stephens	2013	1.0	1.0	0.0	1.0	0.5	0.0	1.0	0.0	1.0	0.0	5.5	Exclude	<6.0
Strunin	2007	1.0	1.0	0.5	1.0	0.5	0.0	1.0	0.5	1.0	0.5	7	Fair	
Sun	2023	1.0	1.0	0.5	0.5	1.0	0.5	1.0	0.0	1.0	0.5	7	Fair	
Thys	2024	1.0	1.0	0.5	1.0	1.0	0.0	1.0	1.0	1.0	0.5	8	Moderate	
Swinkels	2009	0.5	1.0	1.0	0.5	1.0	0.0	1.0	0.0	1.0	1.0	7	Fair	
Verweij	2021	1.0	1.0	0.5	0.5	1.0	0.0	1.0	0.0	1.0	0.5	6.5	Fair	
Vogel	2024	1.0	1.0	0.0	0.5	0.5	1.0	1.0	0.5	1.0	0.5	7	Fair	
Watts	2005	0.0	1.0	0.5	0.5	0.5	1.0	1.0	0.0	0.5	0.5	5.5	Exclude	<6.0
Witt	2024	1.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	0.0	8	Moderate	

Abbreviations: CASP Critical Appraisal Skills Program, Nr: number
1. Was there a clear statement of the aims of the research?
2. Is a qualitative methodology appropriate?
3. Was the research design appropriate to address the aims of the research?
4. Was the recruitment strategy appropriate to the aims of the research?
5. Was the data collected in a way that addressed the research issue?
6. Has the relationship between researcher and participants been adequately considered?
7. Have ethical issues been taken into consideration?
An empty row indicates that question 7 was scored as zero; no subsequent questions were classified.

Data synthesis

Thematic saturation was reached in this data synthesis after several reflexivity meetings with the research team. At that point, the research team agreed that no new themes were constructed based on the latest articles, and hence that adding more would not reveal new information or insights pertaining to the research question (i.e. additional core concepts related to transitional care experiences). Based on our data synthesis we constructed four themes: 1) *care coordination and continuity, 2) communication, 3) patient and family involvement* and *4) individualized support and information exchange* (Figure 3). Quotes related to themes and subthemes are depicted in Tables 2 and 3.

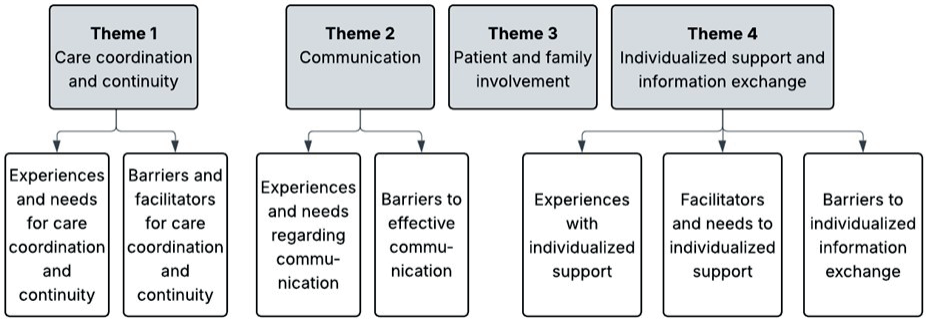


Figure 3: Coding tree: themes and subthemes

Theme 1: Care coordination and continuity

Within this theme, two subthemes were identified: *experiences and needs for care coordination and continuity* and *barriers and facilitators for care coordination and continuity*.

Experiences and needs for care coordination and continuity

Forty-four studies (9 high, 18 moderate, and 17 fair-quality studies) reported patients' and professionals' *experiences and needs for care coordination and continuity* (13, 21-63).

Patients mainly shared their experiences and needs for continuity of aftercare, expressing a strong need for continuity of care after discharge from the hospital (23-25, 31, 40, 45, 46, 51, 53, 56-60). They highly valued any follow-up care provided after discharge and receiving a phone call from a healthcare professional and/or a follow-up visit during which they could ask questions. Nissim et al. illustrate this:

> *"When feeling lost in the maze of their complex care, participants were extremely grateful when members of the medical team responded immediately by telephone or e-mail to questions about symptoms that developed at home or to problems in navigating services"* (51).

Patients did not expect the healthcare professional who called them to be medically involved in their care. It was unclear to patients and healthcare professionals, however, whose responsibility it should be to call up the patient (45, 46, 51, 56-58).

Patients' experiences with hospital discharge varied widely. In some studies, patients described they were well prepared for discharge (23, 31, 45, 52, 53). Patients of other studies experienced poor care coordination and that they had to arrange many things themselves, such as arranging walking aids or making appointments with primary care providers (21, 23, 31, 32, 41, 45-51). Patients expressed a strong desire to have someone to turn to (such as a case manager) for guidance during and after the hospital-to-home transition (23, 27, 31, 32, 34, 36).

According to healthcare professionals, clear rehabilitation goals (23, 26, 31, 33, 36, 38, 39, 61, 64), knowing who coordinates care (23, 30-36, 39), and developing good relationships (23, 29-31, 60) with patients and colleagues were needed for sufficient care coordination.

Barriers and facilitators for care coordination and continuity

Thirty-eight studies (7 high, 12 moderate, and 19 fair-quality studies) reported on organizational and systemic barriers and facilitators for care coordination (21-23, 25-28, 30, 31, 33-41, 43-46, 48, 52-57, 59, 62, 63, 65-70).

Healthcare professionals identified the following barriers for care coordination after discharge. A lack of time (22, 23, 26, 27, 31, 38, 39, 44), insurance issues, such as patients who cannot afford aftercare (22, 35, 38, 41, 43, 48, 54, 70), the administrative burden (22, 38) and not knowing who was responsible for what (22, 34, 35) were identified as significant barriers to guarantee care coordination. To illustrate this:

> *"The nurses all felt a substantial responsibility for the patients, while they were in their care. However, they were unsure who had the overall responsibility for the transition process"* (33).

Healthcare professionals also mentioned facilitators for care coordination after discharge. Early planning and organization of hospital discharge was

one of the main facilitators for sufficient care coordination (21, 23, 26, 30, 31, 36, 40, 44, 45, 53, 55-57, 59, 65, 67, 68). When healthcare professionals were sufficiently prepared for a patient's discharge, for example by knowing the date of discharge in time, they were also better able to prepare their patients for it. Another facilitator for care coordination was the level of expertise of healthcare professionals – it was one of the cornerstones of providing high-quality care coordination (22, 41, 44, 54, 66, 68).

Patients were more willing to continue their treatment with primary care professionals if they were familiar with them and had positive experiences with them (25, 46, 52, 59).

Theme 2: Communication

Two subthemes were identified in this theme: *experiences and needs regarding communication* and *barriers to effective communication.*

Experiences and needs regarding communication

A total of 23 studies (4 high, 10 moderate, and 9 fair-quality studies) reported on experiences and needs regarding professional communication (13, 22, 23, 25, 29-32, 34-44, 47, 52, 54, 62). According to healthcare professionals, interdisciplinary information exchange affects professional communication (22, 23, 29, 31, 36-40, 44, 52, 62). There are various ways of exchanging information, such as discharge letters, phone calls or (secured) e-mails, which were sometimes inadequate. For example, discharge letters did not always reach the person to whom they were addressed, or healthcare professionals were not easily reached by phone. The following quote illustrates this:

> *"General practice and primary care professionals often reported receiving late, inaccurate and/or unclear discharge letters and referrals"* (29).

Hence, there is a need for more effective information transfer methods using standardized protocols or even a shared electronic patient record system for hospital and primary care (23, 31, 32, 39-44, 47).

Barriers to effective communication

Eighteen studies (3 high, 8 moderate, and 7 fair-quality studies) reported barriers to effective communication (22, 23, 26, 29, 31, 33, 35, 37, 38, 41, 45, 50, 53, 55, 59, 62, 67, 71). In some studies, patients and healthcare professionals did not experience sufficient communication (23, 26, 31, 37, 45, 59, 67). Examples of this include healthcare professionals not receiving information

from colleagues, and patients not knowing who to contact in case of questions. To illustrate this:

> *"Professionals reported they communicated mostly via discharge letters, resulting in a lack of personal contact, and pointed out the potential to miss out on crucial information"* (37).

For healthcare professionals, lack of consistency in work schedules, data privacy issues such as not being able to share patient data with other healthcare professionals safely, and a mismatch in perceptions between healthcare professionals were barriers to effective communication (22, 29, 35, 38). A mismatch in perceptions was defined as different healthcare professionals perceiving a situation differently or having different thoughts and interests surrounding the situation. Some healthcare professionals mentioned that this may lead to misunderstandings and distrust between hospital and primary care professionals. This in turn creates parallel working cultures and might escalate into a 'them versus us' approach, which is in turn detrimental for effective communication (22).

Table 2: Supporting data: quotes related to the first two themes and subthemes

Theme 1: Care coordination and continuity (13, 21-63)	
Experiences and needs for care coordination and continuity	*"How am I supposed to take a 94-year-old lady downtown to (an appointment) park the car, and it's right near the Byward market, better of taking a taxi, honest to God. And I never took her, I can't get her out of the house for anything unless you are taking her by, you know, an ambulance, God forbid" (45)*
	*"Really, not one **** is being done [with the referral letter from the hospital], they open it and just continue with their own program anyway" (13)*
	"Safe transitions of care were perceived not only on knowing the patient well, but also on knowing other team members and those from different teams and settings" (29).
Barriers for care coordination and continuity	*"These two sectors [primary care and hospital] operate with distinct care agendas. The practical logic of the primary sector is a holistic approach to care and treatment, whereas the hospital's agenda is to minimize the length of admission" (22).*
	"Multiple individuals in both hospitalist and primary care professional groups described having little time for coordination of care around patient hospitalizations, which compounded the frustration they felt when they had difficulty reaching each other by phone" (35).
Theme 2: Communication (13, 15, 22, 23, 25, 26, 29, 31, 33, 35, 37, 38, 41, 44, 45, 47, 50, 52, 53, 55, 59, 62, 65, 67, 69, 71)	
Experiences and needs regarding communication	*"Even when the postoperative course was complicated, patients retained confidence in their healthcare providers and the healthcare system, as long as lines of communication remained open" (47)*
	"Written or spoken communication should take place any time patient information has to be moved from one level of care to another or from a care setting to the program" (26)
	"Healthcare professionals also discussed referral communication. Doctors explained that there were no structured processes to follow for information exchange during referrals: Yeah, there is no proper way of doing it… inpatients sometimes we must [refer] but as I told you we never had a structured format" (44)
Barriers to effective communication	*"Patients reported they often considered the referral documentation to be of an administrative nature. Consequently, they did not always treat it with sufficient attention, resulting in documentation getting lost or transmittal being delayed" (37)*
	"Primary care professionals described uncertainty in how to contact the hospitalist and having to speak with multiple persons before reaching the correct hospitalist. Hospitalists also described frustration about not having access to direct phone lines for primary care professionals" (35)

Theme 3: Patient and family involvement

Twenty-four studies (5 high, 9 moderate, and 10 fair-quality studies) reported on patient and family involvement (13, 21, 23-25, 31, 36, 37, 39, 41, 45, 47, 52-56, 58-60, 63, 69-71). Patients and healthcare professionals reported their experiences and needs concerning patient and family involvement.

Patients felt it was important to be involved in making decisions regarding their transitional care plan (23, 25, 31, 37, 54, 57, 60, 71). Most patients had preferences regarding their own role. Assuming this role, however, was challenging as patients struggled to assert themselves (23, 31). Not being invited to participate in the decision-making regarding their transitional care plans was not always experienced negatively by patients. One patient indicated, for example:

> *"I didn't take part in the discussion about my care needs. I don't remember that I was asked directly about what I wanted, but they didn't do anything against my will, that's for certain"* (71).

Family support was deemed essential during the transition from hospital to home (21, 23-25, 31, 36, 37, 39, 45, 53-55, 58-60, 71). Caring for loved ones, however, affected the relationship between patients and their family members and could sometimes be stressful and challenging (23, 24, 30-32, 47, 56, 60, 69, 70). That is, balancing caregiving with daily tasks and concerns for a loved one contributes to heightened stress. To manage this, strategies like educating family members, particularly those with low literacy or older individuals (23, 31), and providing timely information can ease their involvement.

Theme 4: Individualized support and information provision

In this theme, three subthemes were identified: *experiences with individualized support, facilitators and needs for individualized support* and *barriers to individualized information exchange.*

Experiences with individualized support

Thirty-one studies (7 high, 16 moderate, and 8 fair-quality studies) reported on experiences with individualized support (13, 21, 23-25, 27-29, 31, 32, 34, 36, 38, 44-46, 48-50, 52, 53, 56, 57, 60, 61, 63, 65, 67, 71, 72). Several studies emphasized the vulnerability of patients during the hospital-to-home transition. Patients sometimes felt powerless, weak, and overwhelmed by the number of healthcare professionals' visits during their hospital stays (21, 32, 49, 50, 52, 65). When they arrived home, it was sometimes hard to adapt to daily life, to get back to work, or to resume other activities (49, 51, 56, 72). To illustrate this, a participant described:

> *"The biggest challenge was fighting it so I would reach remission. But now, the biggest challenge is adapting to the fact that I've had it"* (51).

Patients greatly appreciated feeling heard and indicated to prefer personalized over protocol-based care. Patients were satisfied if they received the support they needed, meaning that they received the right care at the right time, both physically and mentally. Patients felt that primary care providers were essential to achieving their goals at home (23, 29, 31, 36, 45, 46, 48, 50, 52, 60).

In contrast to these positive experiences, patients also expressed negative experiences. Sometimes, patients feel they are a burden to their families and consuming valuable time family members may not always have (23-25, 31, 47, 58, 65, 67, 69). To illustrate this, a participant said:

> *"I wouldn't tell [my daughter] if I deteriorated because she's got a few medical problems as well…So I don't want to burden her"* (58).

Patients also feel they are a burden to healthcare professionals, leading to misunderstandings between patients and healthcare professionals. To illustrate, patients did not want to ask too much time from healthcare professionals. This, in turn, can lead to the feeling of being rushed out of the hospital (23, 27, 31, 36, 65). Consequently, patients sometimes felt abandoned and lacking support (23, 29, 31, 36, 46, 50, 53, 55, 65). When patients had questions after arriving home, for example, the hospital was not always reachable by phone for questions, which was perceived as very frustrating. Some patients even called an ambulance to get answers to their questions (23, 31, 34, 36, 38, 51, 53, 57, 67). Sometimes, patients declined the offered assistance (36, 57, 71), such as recommendations to see a dietitian, as they preferred managing nutrition at home. Patients' desire for various types or amounts of support underscores the necessity for personalized support plans for patients and their families.

Facilitators and needs for individualized support

A total of 24 studies (2 high, 12 moderate, and 10 fair-quality studies) reported on facilitators and needs for individualized support (23, 24, 31, 32, 36, 40, 44-48, 50, 52, 53, 55, 58-60, 62, 63, 65, 67-69). Patients strongly emphasized the importance of individuality and independence. While in the hospital, they were not always independent in their activities, making it crucial for them to regain independence during the transition from hospital to home (23, 31, 58, 60, 68). To patients, feeling included and respected as well as the possibility of thanking healthcare professionals after discharge from the hospital were seen as facilitators for individualized support (23, 31, 44, 46).

A safe environment for patients is a facilitator for personalized support. For example, some patients believed the hospital was the best place to recover. Other patients expressed unfamiliarity with the hospital environment and, therefore, staying in the hospital was confusing, as they missed their daily routine (40, 46, 65).

Barriers to individualized information provision

A total of 25 studies (3 high, 13 moderate, and 9 fair-quality studies) reported on barriers to effective information provision especially related to the quantity, clarity, and correctness of the information provided to patients (21, 23, 31, 32, 36, 37, 41, 44-51, 53, 55, 57-59, 65, 67, 69, 71, 73). Several studies reported that patients received information that was unclear to them. Information was also often incorrect, unavailable, or provided at the wrong moment (21, 23, 31, 37, 41, 44, 46, 48-51, 53, 57, 59, 64, 65, 67, 69, 71, 73). Patients also indicated they typically received a lot of information at once, which overwhelmed them (15, 23, 31, 32, 41, 44, 45, 51, 53, 57-59, 64, 67). The following quote illustrates that information provided during the transition process does not always stick:

> *"You read it but you don't really take it in…like there were things that were said by the doctors that my wife heard and remembered, and I didn't get"* (51).

Studies mentioned a strong need for appropriate, honest, and detailed information that is understandable to patients and their families. This information should be provided in a timely manner, and there should be an opportunity to ask questions (36, 37, 41, 44-47, 55, 73).

Not daring to ask questions is also a barrier in information provision. Patients might often think, for example, that their problems are not severe enough to seek help (36, 46, 65). Moreover, they often do not dare to ask questions, because they think healthcare providers are too busy to answer them. To illustrate, a participant said:

> *"You can't ask doctors or nurses questions even if you don't understand because they don't keep still long enough"* (65).

Trust also plays a significant role in this subtheme. That is, patients only dare to ask questions if they trust healthcare professionals (46, 52, 55, 59, 67).

Table 3: Supporting data: quotes related to theme 3 and 4, and subthemes

Theme 3: Patient and family involvement (13, 21, 23-25, 31, 36, 37, 39, 41, 45, 47, 52-56, 58-60, 63, 69-71)	
Patient involvement	*"Some of the participants believed that their family was involved in the process and had communicated with the healthcare staff. This was experienced differently; for some participants, not having to deal with planning the discharge seemed to be a relief, whereas others perceived it negatively and had been left feeling dissatisfied" (71)*
Family involvement	*"An interesting phenomenon is the transformation of family caregivers from supportive supporters to surrogates and advocates for care decisions, and the closeness of the relationship between health care workers and family caregivers even more than patients, which are mutually understood and commonplace" (32)*
	"All carers explained that sustaining family relationships with the older adult required them to transition from being a family member to being a family carer" (31)
Theme 4: Individualized support and information provision (13, 21, 23-25, 27-29, 31, 32, 34, 36, 38-40, 44-46, 48-50, 52, 53, 55-57, 60-67, 71, 72)	
Experiences with individualized support	*"Adjusting to life post-discharge involved learning to rely on others, a state of dependency that sometimes undermined their identity as an independent and productive individual. As one participant described, "It's frustrating to watch my wife do everything. I have two kids and I feel like my wife [has] become a single mom with a third kid now because of having to do everything" (51)*
	"Patient and carer participants described caring relationships with healthcare practitioners in terms of feeling cared for as a person, feeling included and respected" (31)
	"Frequently, patients also felt abandoned by the health care system once they left the hospital: "Because once they let you out the hospital, that's it, you gone. You are no longer our responsibility" (65)
Facilitators and needs for individualized support	*"Finally, patients reported feeling guilty and uncomfortable because although they needed their caregivers to assist them, they did not want to become a burden" (47)*
	"Patients often described a 'wait and see' approach that, in some instances, delayed further investigation or precipitated a crisis: No, don't ring the ambulance. I'll be right till the morning. It'll only be a bit of bruising" (36)
	"When they first came home, many had felt insecure about no longer being in the safe environment of the hospital" (65)
Barriers to individualized information exchange	*"Discharge letters contained mistakes, leading to inadequate care provision after discharge. Incomplete or insufficient information delivered to family members on patients' (in)abilities caused a feeling of being ill-prepared for the care tasks expected of them after hospital discharge" (66)*
	"Many participants felt that the information was delivered in an inappropriate format: 'It would have been nice to have somebody sit down with me and say this is what's happened, this is why it's happened, this is what you can expect" (69)

The secondary analysis showed that there was a well-balanced distribution of the four themes across the countries involved in the studies included (see

Appendix 2). This secondary analysis also revealed that non-Western countries were underrepresented in our study.

DISCUSSION

This systematic meta-synthesis is the first to provide a comprehensive overview of experiences with hospital-to-home transitions from the perspective of patients, family members, and (allied) healthcare professionals. We adopted a novel approach by combining the experiences of various stakeholders to obtain more comprehensive information on hospital-to-home transitions from a diverse range of perspectives. This information can inform healthcare professionals, researchers, and policymakers who wish to develop interventions to optimize care coordination and continuity after hospital discharge, thus enhancing health-related outcomes and reducing costs. We identified four themes that transcend the results of the current literature. This study adds information on how patients, family members, and healthcare professionals experience hospital-to-home transitions and what they need to optimize the experience of this transition. These themes *were: care coordination and continuity, communication, patient and family involvement, and individualized support and information exchange, and* were supported by high-quality evidence.

The first theme – care coordination and continuity - illustrates the importance of supporting patients in arranging their follow-up care to allow them to pursue their recovery with primary care professionals in a timely manner. Our findings suggest that patients would benefit from a phone call or follow-up appointment from the hospital. Patients find it easier to receive follow-up care from primary care professionals with whom they are already familiar. The feasibility and effectiveness of post-hospital discharge telephone follow-up have previously been assessed in a study by Harrison et al. (74). They found telephone follow-up to be feasible in reaching older adults and effective in identifying post-hospital problems experienced by older adults. However, further research should focus on the feasibility and effectiveness of follow-up interventions in other populations, particularly those with allied healthcare needs, as they require prompt follow-up care after discharge. In our study, healthcare professionals also expressed a need for more timely preparation of a patient's discharge, more explicit multidisciplinary rehabilitation goals, approachable and available colleagues, and precisely knowing each other's roles and who is responsible for coordinating follow-up care. In line with our findings, previous research on user experiences during the transition from hospital to home in

older individuals identified that clarifying 'who is taking care of what' is crucial for effective collaboration among healthcare providers (75, 76). Other studies have previously demonstrated the benefits of transmural collaboration within an interdisciplinary network of (allied) healthcare professionals (66, 77).

The second theme – communication - illustrates experiences, needs, and barriers regarding communication. An interesting finding was the occurrence and consequences of mismatched perceptions about referral information. Hospital and primary care healthcare professionals have different thoughts and expectations regarding the content of information they exchange, which may negatively affect communication between them and, in turn, affect the quality of care provided. Researchers have previously suggested using shared electronic patient records for hospitals and primary care settings to enhance interprofessional communication (35, 78). Jones et al. found that both hospital and primary care professionals proposed shared electronic medical records as a solution to enhance information exchange in care coordination (35). This finding was corroborated by Munchof et al. However, each care setting generally uses a different electronic system, which poses an implementation challenge (79). Together with our results, this implies a need to develop innovative and more effective solutions to close the communication loop between hospital and primary care professionals.

The third theme – patient and family involvement - illustrates the importance and challenges of involving patients and families in making decisions regarding hospital-to-home transitions. From our results and other sources, it is clear that patients and their families experience shifting relationships when families have to care for their loved ones (42, 62). Therefore, involving patients and families at all stages of the hospital-to-home transition is essential. Naylor et al. outlines strategies for implementing patient and family involvement in hospital-to-home transitions, such as comprehensive goals assessment, progress monitoring, demonstrating respect, and evaluating engagement levels (80). Additional research is needed to explore the practical implications of implementation of such strategies. We recommend involving patients and informal caregivers in designing, implementing and evaluating these strategies to ensure sustainable change and improvement in transitional care.

The fourth theme – Individualized support and information provision - illustrates experiences, needs, facilitators and barriers regarding personalized strategies of providing support and information to patients. Our results stress that patients can be vulnerable at the moment of hospital discharge and may need personalized support. Another result was the importance of

how information is provided to patients, which was often unclear, incorrect, or overwhelming for patients. Menichetti et al. outlines cognitive strategies, including simplification, clustering, ordering, repetition, and teach-back, as beneficial tools for healthcare professionals to optimize information provision to patients transitioning from hospital to home. To effectively employ these strategies, further effort should focus on educating healthcare professionals on these topics (81).

Strengths and limitations

This meta-synthesis provides extensive insight into current experiences with hospital-to-home transitions and could offer important leads for developing and implementing future transmural care pathways for patients needing complex care interventions after hospitalization. We included a large number of studies conducted in fourteen different countries, increasing our findings' transferability and the richness of our results. Our secondary analysis shows that our results may apply to different healthcare systems in different parts of the world. It should be noted that some non-Western countries, such as those in the southern hemisphere, are underrepresented in the results of our study.

This meta-synthesis was conducted following a rigorous methodology. An extensive search was performed, followed by a thorough critical selection and appraisal method. Moreover, a snowball search was conducted to include as much available data as possible. Thereby, we excluded insufficient-quality articles according to the rules of Butler et al. with a CASP score <6.0, and all themes we identified were supported by high-quality studies with a CASP score >9.0, implying a high level of evidence for each theme (16). Many articles were identified, and we found indications of inductive thematic saturation, which appeared during the analysis process when no new themes were emerging (82).

However, some limitations to our study can be identified. First, due to the large number of researchers participating in the selection process, uniformity in article selection was possibly affected negatively. To minimize this selection bias, we used sample checks and held meetings during the screening phase to monitor and guide the process. Second, the perspective of family caregivers is minimally represented in our meta-synthesis. This may be because the opinions of patients and family members are often presented in a combined manner. Consequently, our results mainly represent the perspectives of patients and healthcare professionals, which provided us with a broad view from different perspectives. Third, we recognize that there may be overlap in the information presented in different subthemes due to the complexity of the data. However,

reporting experiences, needs, barriers, and facilitators distinctly provided a more nuanced and comprehensive understanding of the studied phenomena.

CONCLUSION

This study revealed both positive and negative experiences of patients, family members, and professionals, as well as barriers and facilitators regarding hospital-to-home transitions across various care settings, countries, and populations. Tailored information and support are prerequisites for a seamless transition and an optimal recovery after hospital discharge. Particular attention should be paid to the amount, the mode of communication and the timing of information and support provision to patients and their families. On the other hand, healthcare professionals should communicate more effectively within and across care settings to guarantee optimal coordination. Individual professional roles should be clarified to ensure continuous collaboration and, thus, continued high-quality care provision after hospital discharge. When ensuring continuity of care through the design of integrated transitional care interventions, these findings should be considered, and strategies implemented. Novel research methods, such as implementation research, can be used to investigate how best to implement measures addressing the barriers and facilitators identified in this study.

Data availability: Data will be available upon request via DataVerse NL https://doi.org/10.34894/YYIIY6

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APPENDICES





Chapter 5

The impact of multidisciplinary transitional care interventions for complex care needs: A systematic review and meta-analysis

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ABSTRACT

Background and Objectives

Multidisciplinary transitional care interventions (MTCIs) ensure care coordination and continuity after hospital discharge while addressing (older) patients' complex care needs related to their physical, nutritional, cognitive, and/or psychological status. This study aimed to identify, critically appraise, and synthesize the current body of evidence investigating the effectiveness of such interventions.

Research Design and Methods

Medline, Embase, CINAHL, and CENTRAL were searched for randomized controlled trials assessing MTCIs' impact on readmissions, mortality, and health-related outcomes from inception to July 2024. Risk of bias was evaluated with the Risk of Bias-2 tool. Subgroup analyses assessed whether different intervention types affected outcomes differently. The certainty of the evidence was assessed with the Grading of Recommendations Assessment, Development, and Evaluation approach and the credibility of subgroup analyses with the Instrument to evaluate the Credibility of Effect Modification Analyses.

Results

Forty-nine trials involving 25,566 patients were included. There was low certainty that MTCIs reduced readmissions (relative risk [RR] = 0.88; 95% confidence intervals [95% CI] = 0.80 to 0.96) and high certainty for reduced mortality (RR = 0.92; 95% CI = 0.84 to 1.01). There was low to moderate certainty that MTCIs improved physical quality of life (standardized mean difference [SMD] = 0.54; 95% CI = −0.06 to 1.15), mental quality of life (SMD = 0.44; 95% CI = −0.08 to 0.96), patient satisfaction (SMD = 0.49; 95% CI = −0.14 to 1.12), and physical performance (SMD = 0.49; 95% CI = −0.11 to 1.10). Subgroup analysis revealed a larger and statistically significant effect on physical performance in more complex interventions (SMD = 0.83; 95% CI = 0.02 to 1.65).

Discussion and Implications

These findings suggest that MTCIs can reduce readmissions and mortality while improving quality of life and physical performance. Further investigations should focus on tailoring MTCIs to specific contexts to maximize their impact

BACKGROUND AND OBJECTIVES

Over the past decades, the complexity of patient care during hospitalization and after discharge has increased, primarily due to the aging population and the rising prevalence of multimorbidity (1, 2). In 2021, the global prevalence of multimorbidity was 37.2%, and recent research shows that multimorbidity is associated with aging (3). Older and/or patients with multimorbidity typically have more *complex care needs* – which include medical, nursing, and allied healthcare needs related to physical, nutritional, cognitive, and/or psychosocial status – because of interactions between many factors in their socio-ecological environment and inherited biology (e.g., lack of social support, psychological or emotional dysregulation, inappropriate utilization of healthcare services) (4).

Research indicates that hospitalized patients, especially those with multimorbidity, often experience care fragmentation after discharge, which refers to limited, non-continuous, episodic, and disorganized care across multiple healthcare practitioners and settings (5-7). Fragmented care may result in unplanned readmissions, emergency department visits, or mortality, as patients, particularly those with complex care needs, may not have received the necessary follow-up care in the community after hospital discharge (5, 6). Evidence suggests, for example, that patients with complex care needs require more support, preferably tailored, to navigate their way through community care services (8). However, current practices regarding hospital-to-home transitions seem to be suboptimal. Patients, family members, and healthcare professionals often experience a lack of coordination and continuity of care after discharge, partially attributed to rare or inefficient communication between healthcare professionals across settings (9). Therefore, there is a need for effective transitional care interventions aimed at ensuring coordination and continuity of care across various locations or levels of care (10).

Several systematic reviews investigating the effects of transitional care interventions suggest that they reduce hospital readmission rates and enhance health-related outcomes (11, 12). Historically, these interventions were often monodisciplinary and mainly focused on ensuring medication adherence or medical care needs. However, with the increased complexity of patient follow-up care, a more comprehensive approach might be needed to encompass medical care, nursing care, and care provided by allied health professionals in the community. In recent years, such interventions have been developed and evaluated and are referred to as multidisciplinary transitional care interventions in this systematic review (13-16).

Multidisciplinary transitional care interventions involve a range of hospital and community care professionals, including physicians, nurse practitioners, physical therapists, occupational therapists, dieticians, social workers, and speech and language therapists. However, the specific content of such intervention can differ widely, ranging from a discharge summary provided to patients leaving the hospital to interventions that employ dedicated multidisciplinary care teams that coordinate and provide tailored recovery trajectories, both in hospital and after discharge. A recent systematic review by Tyler et al. (2023) investigated if the number of components (e.g., a follow-up phone call or a medication review) of a transitional care intervention influenced its effectiveness on healthcare utilization (17). It revealed that, compared to usual care, interventions with fewer components were more effective at reducing healthcare utilization, while more complex interventions increased patient satisfaction. However, Tyler et al. (2023) did not differentiate multidisciplinary interventions targeting patients' complex care needs from those solely addressing medical needs, nor did they assess the impact of such interventions on health-related outcomes, such as physical, cognitive, and psychological status. Hence, there remains a lack of conclusive evidence regarding the effectiveness of interventions that employ a multidisciplinary approach and simultaneously address patients' complex care needs, that is, a combination of medical, nursing, and/or allied healthcare needs.

Therefore, this systematic review and meta-analysis aimed to identify, critically appraise, and synthesize the current body of randomized controlled trials (RCTs) investigating the effectiveness of multidisciplinary transitional care interventions on hospital readmissions and health-related outcomes. A secondary aim of this review was to assess whether different types of interventions have different effects on readmissions and health outcomes. This secondary aim was added to account for the relatively wide variability in the content of transitional care interventions and to provide insight into the most effective intervention types that can serve in the future (re)design of optimal multidisciplinary transitional care interventions.

RESEARCH DESIGN AND METHODS

This systematic review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and was registered in PROSPERO (CRD42023421423) (18). The PROSPERO protocol describes a mixed-method systematic review investigating facilitators and barriers to the implementation,

as well as the (cost-)effectiveness, of multidisciplinary transitional care interventions. Because of the large number of studies and the richness of the data identified, the current review focuses on RCTs evaluating the effectiveness of multidisciplinary transitional care interventions on readmissions and health-related outcomes. A systematic review on the facilitators and barriers to the implementation and the (cost-) effectiveness will be published separately (19).

Data sources and searches

Searches were conducted in Medline, Embase, CINAHL, and CENTRAL by an experienced medical information specialist from inception until July 2024. A combination of several groups of index terms and respective keywords were used: transitional care, continuity of patient care, patient readmission, multimorbidity, etc. Additional records were identified by screening the reference lists of the included papers and the snowball method using Google Scholar(20). The complete search strategy for each database is available in supplementary material Appendix 1.

Study selection

Randomized controlled trials or cluster RCTs were eligible for inclusion if they: 1) included adult patients admitted to a hospital regardless of their conditions, 2) evaluated multidisciplinary transitional care interventions for hospital-to-home transitions (i.e., delivered by at least 2 healthcare professionals of distinct expertise, for example, a nurse practitioner and a physical therapist) addressing medical, nursing, and allied healthcare needs (i.e., needs related to physical, cognitive, nutritional, and/or psychosocial status) , 3) compared the intervention to usual care, 4) reported on unplanned readmissions, mortality, emergency department visits, quality of life, physical status, cognitive status, psychological distress, and/or patient satisfaction with the intervention. Studies focusing on populations suffering from mental illnesses or requiring palliative care were excluded. Retrieved records were imported into Rayyan (http://rayyan.qcri.org). After duplicate removal, titles and abstracts were screened by all authors, in pairs of two. Next, pairs of reviewers (RC, JvG, and EL) independently assessed full texts for eligibility. Disagreements between reviewers were resolved during consensus meetings.

Outcome measures

The primary outcomes were all-cause unplanned hospital readmission (number of individuals readmitted), mortality (number of individuals who died), and emergency department visit (number of individuals who visited

the emergency department) rates, as well as quality of life (self-reported questionnaires). Secondary outcomes included physical performance (self-reported questionnaires on difficulties in activities of daily living), physical capacity (measured, for example, with submaximal exercise tests), cognitive status (self-reported questionnaires), psychological distress (self-reported questionnaires on anxiety and depression), and patient satisfaction (self-reported questionnaires).

Data extraction

For each study, we extracted the following information: author's name, publication year, country, study design, description of the main components of the intervention, the types of hospital and community care professionals delivering the intervention, patient characteristics (i.e., disease or condition, sample size, mean age, and gender distribution), the type of control group, outcome measures, and outcome measurement instruments. One reviewer (RC) extracted data, which were then checked for consistency by a second reviewer (JvG).

Risk of bias assessment

Two reviewers (RC and JvG) independently evaluated the risk of bias of each article using the Risk of Bias, version 2 (RoB2) or RoB2 for cluster randomized trials tools (21, 22). These tools provide a comprehensive framework for assessing five key domains: the randomization process, deviations from the intended interventions, missing outcome data, measurement of the outcome, and selection of the reported results. Each domain within the RoB2 tool was scored as "low risk", "some concerns", or "high risk" based on the identified issues. With the help of the algorithm provided in the Cochrane guidance document (22), a final judgment was made for each paper, which was classified as having a "low", "some concerns", or "high" risk of bias.

Statistical analysis and synthesis and GRADE assessment

All analyses were conducted in R, using the meta package (23). To pool effect sizes based on dichotomous data (i.e., readmissions, mortality, emergency department visits), we used the Mantel-Haenszel method and calculated risk ratios (24). To pool effect sizes of continuous outcomes measured with different instruments or tests, we calculated standardized mean differences and reported 95% confidence intervals. When medians and interquartile ranges were reported, we converted them into means and standard deviations if the interquartile range was symmetrical around the median. We then performed

meta-analyses if post-intervention outcomes for intervention and control groups were reported in 2 studies or more. We assessed heterogeneity by visually examining forest plots and assessing the I^2 statistic. When there was an indication of high heterogeneity (i.e., when $I^2 > 50\%$), we presented the results of the random effects meta-analyses. Otherwise, we presented the results of the fixed effects meta-analyses. We conducted a narrative synthesis when a meta-analysis was inappropriate (e.g., when results were reported in a graph where we could not precisely retrieve outcome values or when only p values were reported).

For interpreting the results of the individual comparisons, we followed the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) methodology (25). Instead of solely looking at the statistical significance of comparisons, the GRADE approach "downgrades" the level of evidence of a comparison based on five factors to provide a more solid foundation for clinical decision-making (26):

1. *Overall risk of bias:* downgrading the certainty of the evidence when the methodological quality of the body of evidence was a threat (i.e., if >50% of the trials were assessed as high-risk).
2. *Consistency*: downgrading the certainty of the evidence when effects were inconsistent across studies (i.e., if I^2 was > 50%).
3. *Precision:* downgrading the certainty of the evidence when confidence intervals were wide, hence when the uncertainty around the pooled effect size was considered too large (i.e., if one or both boundaries of the confidence interval suggested inferences appreciably different from the point estimate). When the confidence interval was very wide, we downgraded two levels (27).
4. *Directness*: downgrading the certainty of the evidence when evidence was obtained from different populations than the population studied.
5. *Publication bias*: downgrading the certainty of the evidence when there was evidence of selective reporting of outcomes based on the direction or strength of the effect or their statistical significance (i.e., if the Egger's test P-value was <0.05 or examination of funnel plots indicated publication bias).

In line with the GRADE approach, we refer to the level of evidence as "certainty".

Subgroup analysis

To assess whether different intervention types had different effects on the primary and secondary outcomes, we categorized interventions into three distinct types before conducting any analysis. This categorization was based on discussions among our research team members, including many allied health professionals.

- Type 1 interventions consisted of setting up a transitional care plan in-hospital and referring patients to relevant community care (allied health) professionals;
- Type 2 interventions were similar to type 1 interventions. However, they comprised a case manager who coordinated hospital-to-home transitions by facilitating interactions between the hospital, patients and their families, and community care settings.
- Type 3 interventions were the most complex as they comprised a comprehensive recovery trajectory delivered by dedicated multidisciplinary teams from the hospital who took care of the entire post-discharge rehabilitation process through outpatient rehabilitation, home visits, and phone calls.

We hypothesized that more complex interventions (type 2 and 3) would impact readmissions and health-related outcomes more than simple interventions. Moreover, we performed sensitivity analyses excluding studies with a high risk of bias. The sensitivity analyses were not stratified for intervention type because the number of studies became too small to interpret the results.

To interpret the results of the subgroup and sensitivity analyses, we followed the GRADE guidance group's latest recommendations (28). Briefly, we performed Q tests to check for possible subgroup effects (i.e., the relevance of conducting a subgroup analysis per intervention type or per risk of bias). If the P-value for the Q test was 0.1 or higher, no further investigation of subgroup effects was conducted. When the P-value was smaller than 0.1, we used the Instrument to assess the Credibility of Effect Modification Analyses (ICEMAN) to determine the credibility of the subgroup analysis. The ICEMAN instrument can be used to assess whether an effect modification exists with the help of nine criteria to judge the internal consistency (i.e., whether the results of the subgroup analysis are internally consistent with the overall study findings), the statistical power (i.e., whether the subgroup analysis has adequate statistical power to detect meaningful differences, considering the number of studies in each subgroup), and the methodological rigor of subgroup analyses (i.e., how the subgroups were defined, the appropriateness of statistical methods used, and how potential biases were addressed)(29). For subgroup analyses, we use the term “credibility”, which refers to the degree of confidence that the observed effect modification reflects a true difference in effects across subgroups, rather than being the result of random variations or bias. ICEMAN's final rating of the credibility of the subgroup effect ranges from "very low" to "high". When the credibility of a subgroup effect was "very low" or "low", we only reported the overall estimate and hence the subgroup effects were

not reported. When the credibility of the subgroup analysis was "moderate" or "high", we did report the subgroup effects from random effect meta-analyses using the GRADE approach.

RESULTS

After duplicate removal, titles and abstracts of the remaining records (n=38,754) were screened for eligibility, leaving 158 studies meeting the inclusion criteria (Figure 1 PRISMA flowchart). Hundred-sixteen records were excluded based on full-text screening, and 43 records remained. Six additional papers were identified through a snowball search.

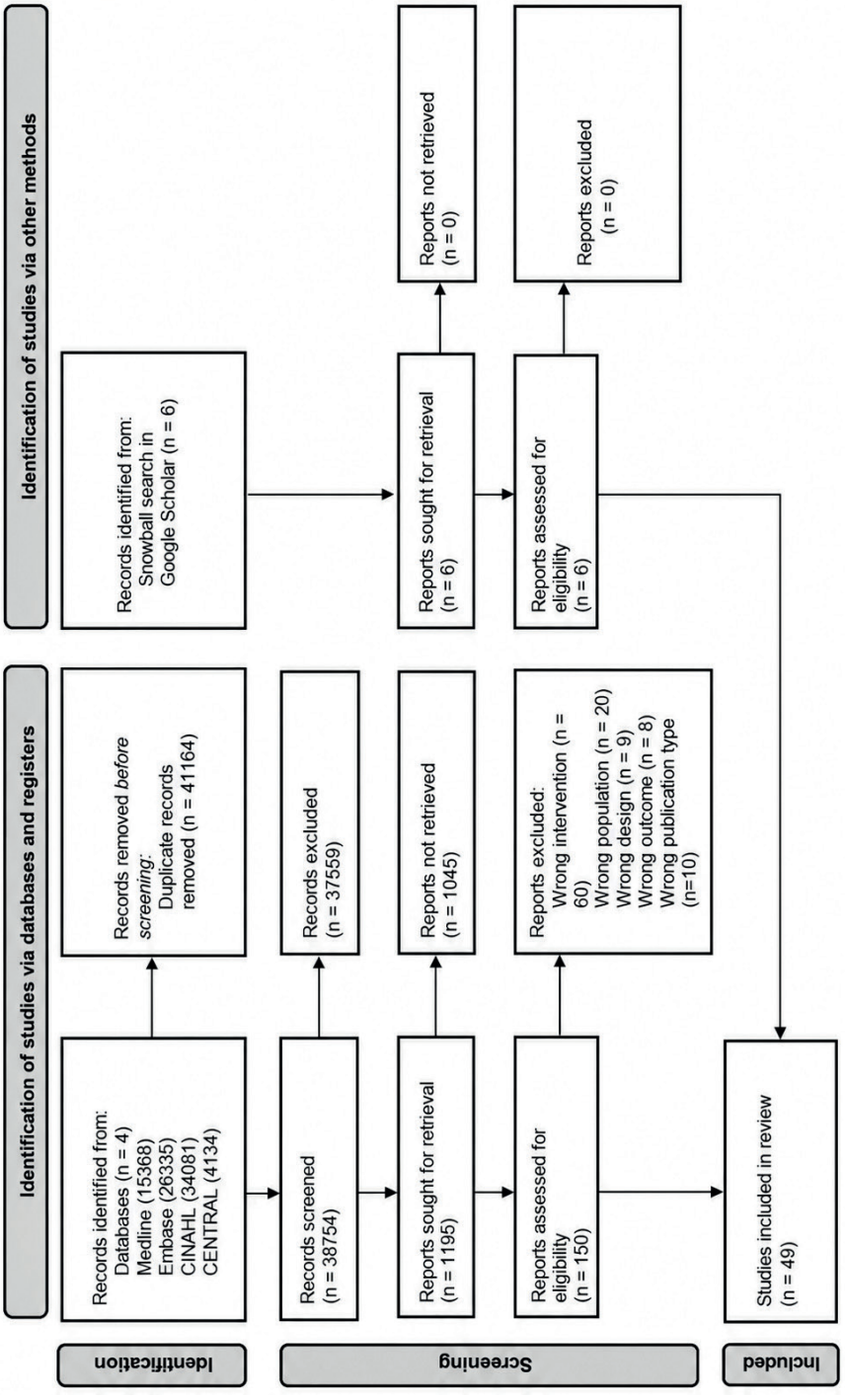


Figure 1: PRISMA flowchart

Forty-eight articles were included and critically appraised, of which 45 were randomized controlled trials (92%) and four cluster randomized controlled trials (8%). The characteristics of the included studies are detailed in Table 1, and summarized descriptions of the interventions per study are provided in the supplementary material Appendix 2. The full references of the included studies are provided in Supplementary material, Appendix 6.

Study characteristics

The included studies were published between 1993 and 2023 and were conducted in sixteen countries, the majority of which were located in Northern America (n=22, 45%), Europe (n=15, 31%), and Oceania (n=5, 10%). The total sample contained 25,566 participants, of whom 46% (n=11,662) was female, 48% (n=12,269) was male, and 6% (n=1,635) was unspecified. Patients were generally 65 years and older (32 studies), and their primary diagnoses during admission varied, the majority being related to cardiovascular (18 studies), pulmonary (16 studies), and neurological (10 studies) conditions (Table 1).

Table 1: Study characteristics

First author, year[5]	Ref. nr.	Country	Sample size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care professionals involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of intervention*
Allen, 2002	1	USA	93	I=69.0 (12.0) C=72.0 (10.0)	I=27/20 C=25/21	Neurological	NA	Physician	Nurse practitioner, physician, pharmacist, dietitian, social worker	3 to 7 days after discharge and up to 3 months	Physical performance and capacity, depression, health-related quality of life, readmission rate, mortality rate	2
Altfeld, 2013	2	USA	740	I= 74.1(6.9); C=75.0(6.9); Overall= 74.5(6.9)	NA	Older patients, not further specified	Overall= 4.9 (6.2) I= 5.0 (4.5) C= 4.9 (7.5)	Home health providers, not further specified, and physician	Social worker	Within 2 days after discharge and up to 1 month	Readmission rate, mortality rate	2
Atwood, 2022	3	Canada	3710	I= 71.2(10.5) C= 73.8(11.7)	I=313/291 C=1530/1576	Pulmonary	I= 6.0(4.0)**; C= 5.0(5.0)**	Not specified	Nurse practitioner, respiratory therapist, physician, pharmacist, and allied health providers, not further specified	During hospitalization and up to 10 days after discharge	Readmission rate, emergency department visit rate	2
Baghaei, 2021	4	Iran	120	I= 57.3(9.6); C=55.4(9.2)	I=11/49C=18/42	Cardiovascular	NA	None	Nurse practitioner, physician	During hospitalization and up to 3 months after discharge	Anxiety, readmission rate	3
Balaban, 2008	5	USA	196	I= 58.0(NA); C=54.1(NA); Historical C=61.1(NA)	I=27/20 C=30/19 Historical C=60/40	Older patients, cardiovascular, pulmonary	I= 3.3(NA) C= 3.1(NA)	Primary care providers, not further specified	Nurse practitioner	During hospitalization and up to 1 month after discharge	Readmission rate, emergency department visit rate	2
Balaban, 2015	6	USA	1510	I=66.4 (15.5) C=63.7 (16.7)	I=323/262 C=548/377	Older patients, cardiovascular, pulmonary	I= 3.0(2.4) C= 3.5(3.8)	Nurse practitioner, community services, not further specified	Patient navigator, not further specified	During hospitalization and up to 1 month after discharge	Readmission rate, emergency department visit rate	2

First author, year[5]	Ref. nr.	Country	Sample size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care professionals involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of intervention*
Balaban, 2017	7	USA	1921	Age 60+ years: I=74.5(9.8) C=75.1(9.4) Age <60 years: I=46.2(9.6) C=45.7(10.8)	Age 60+ years: I=315/230; C=483/305 Age <60 years: I=95/99; C=205/189	Older patients, cardiovascular, pulmonary	I= 3.1(2.5) C= 3.6(4)	Primary care providers, not further specified	Patient navigator, not further specified	During hospitalization and up to 1 month after discharge	Readmission rate	2
Casas, 2006	8	Spain	155	I=70.0(9.0) C=72.0(9.0)	I=15/50 C=11/79	Pulmonary	I=8.5(5.5) C=7.8(4.2)	Physician, nurse practitioner, social worker	Nurse practitioner	During hospitalization and up to 9 months after discharge	Readmission rate, mortality rate	2
Coskun, 2022	9	Turkey	64	NA	I=9/23 C=5/27	Cardiovascular	NA	None	Physician, nurse practitioner, physiotherapist, dietician	During hospitalization and up to 6 months after discharge	Physical performance, physical and mental quality of life, readmission rate, emergency department visit rate	3
Courtney, 2009	10	Australia	122	I=78.1(6.3) C=79.4(7.3) Overall= 78.8 (6.9)	I=36/22 C=40/24	Older patients, cardiovascular, pulmonary, gastrointestinal, trauma, and comorbidities	Overall= 4.6(2.9) I= 4.6(2.7) C= 4.7(3.3)	None	Nurse practitioner, physiotherapist	During hospitalization and up to 6 months after discharge	Physical and mental quality of life, readmission rate	2
Davidson, 2010	11	Australia	105	I=71.6(NA) C=73.9(NA)	I=20/33 C=21/31	Cardiovascular	NA	None	Nurse practitioner, physiotherapist	At discharge and up to 3 months after discharge	Physical capacity, readmission rate, mortality rate	3
Del Sindaco, 2007	12	Italy	173	I=77.4(5.9) C=77.5(5.7)	I=42/44; C=41/46	Cardiovascular	NA	Physician	Physician, nurse practitioner	During hospitalization and up to 6 months after discharge	Readmission rate, mortality rate, health-related quality of life, physical capacity	2
Deng, 2021	13	China	84	I=45.7(13.9) C=48.2(7.3) Overall=47.9(12.6)	I=12/30C=10/32	Limbs disabilities	NA	Physician, physiotherapist, nurse practitioner, social worker	Physician	At discharge and up to 6 months after discharge	Physical performance, physical and mental quality of life	3

First author, year[5]	Ref. nr.	Country	Sample size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care professionals involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of intervention*
Dhalla, 2014	14	Canada	1932	I=71.2(16.1) C=71.3(16.0)	I=472/491 C=465/495	Cardiovascular and other conditions not further specified	NA	Physician, community services (e.g., occupational therapy)	Physician, pharmacist, nurse practitioner, clerical assistant, coordinator	During hospitalization and up to 1 year after discharge	Physical performance, readmission rate, mortality rate, emergency department visit rate	2
Donnelly, 2004	15	UK	113	Median age: I= 68.0 C= 71.0	NA	Neurological	I= 42.0(NA) C= 50.0(NA)	Occupational therapist, physiotherapist, speech and language therapist, rehabilitation assistants	Nurse practitioner, coordinator	During hospitalization and up to 1 year after discharge	Health-related quality of life, physical and mental quality of life, patient satisfaction	3
Evangelista, 2023	16	Italy	802	I=75(13.6) C=74.4(13.9) Overall=74.7(13.7)	I=175/213 C=221/193	Cardiovascular, pulmonary, gastrointestinal, urological, musculoskeletal, endocrine, neoplasm, neurological	NA	Not specified	Multidisciplinary team, not further specified	During hospitalization only	Readmission rate, mortality rate, emergency department visit rate	1
Evans, 1993	17	USA	835	NA	I=16/401 C=25/393	Medical (mainly cardiovascular, pulmonary, gastrointestinal, musculoskeletal, neoplasm), and neurological	NA	Home healthcare and community agencies, not further specified	Social worker, physician, nurse practitioner	During hospitalization only	Readmission rate	1
Finkelstein, 2020	18	USA	782	NA	NA	Medically and socially complex patients, not further specified	NA	Community health workers, not further specified	Nurse practitioner, social worker	During hospitalization and up to 3 months after discharge	Readmission rate	2

First author, year[5]	Ref. nr.	Country	Sam-ple size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care profession-als involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of inter -ven -tion*
Finlayson, 2018	19	Australia	222	Exercise I=77.6(6.5) Nurse I=77.8(6.2) Exercise + Nurse I=77.1(7.64) C=77.9(6.2)	Exercise I=42/14 Nurse I=37/17 Exercise + Nurse I=46/11 C=37/18	Older patients with cardiovascular, pulmonary, urological, and other non-specified conditions	Overall= 5.0(1.0-47.0)**; Exercise I=6.8(6.3) Nurse I= 5.1(3.8); Exercise + Nurse I=5.0(1.0-13.0) ** C= 5.0(1.0-34.0)	None	Exercise physiologist, nurse practitioner	During hospitalization and up to 6 months after discharge	Readmission rate	3
Fjaertoft, 2003	20	Norway	320	I=74.0(NA) C=73.8(NA)	I=74/86 C=90/70	Neurological	I= 18.6(NA) C= 31.1 (NA)	In cooperation with the primary healthcare system, not further specified	Physiotherapist, occupational therapist, nurse practitioner, physician	During hospitalization and up to 1 month after discharge	Physical performance	3
Fjaertoft, 2011	21	Norway	320	I=74.0(NA) C=73.8(NA)	I=74/86 C=90/70	Neurological	NA	In cooperation with the primary healthcare system, not further specified	Physiotherapist, occupational therapist, nurse practitioner, physician	During hospitalization and up to 1 month after discharge	Physical performance, mortality	3
Garcia-Aymerich, 2007	22	Spain	62	I=72.0(10.0) C=73.0(9.0)	I=4/17 C=4/37	Pulmonary	NA	Physician, social worker, primary care team, not further specified	Nurse practitioner	During hospitalization and up to 9 months after discharge	Health-related quality of life	2
Hofstad, 2014	23	Norway	306	Group 1: I=70.6(NA) Group 2 I=72.0(NA); C=74.2(NA)	Group 1: I=47/56 Group 2: I=61/43 C=47/52	Neurological	NA	Nurse practitioner, physiotherapist, occupational therapist	Nurse practitioner, physiotherapist, occupational therapist, physician	During hospitalization and up to 6 months after discharge	Physical performance and capacity, patient satisfaction	3

First author, year[5]	Ref. nr.	Country	Sam-ple size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care profession-als involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of inter -ven -tion*
Hu, 2020	24	China	220	I=33.0(7.7) C=31.8(9.2)	I=30/70 C=40/58	Urological	NA	None	Nurse practitioner and chronic disease management specialist, not further specified	During hospitalization and up to 1 month after discharge	Readmission rate, patient satisfaction, emergency department visit rate	2
Hung, 2023	25	Taiwan	96	I=43.4(12.9) C=41.1(14.1)	I=22/21 C=24/18	Trauma	I=7.2(4.6) C=8.1(5.6)	None	Nurse practitioner, physician, rehabilitation therapist	During hospitalization and up to 14 days after discharge	Health-related quality of life	2
Jack, 200	26	USA	749	I=50.1(15.1) C=49.6(15.3)	I=178/195 C=200/176	General medical, not further specified	I=2.8(3.4) C=2.6(3.0)	Physicians	Nurse practitioner, pharmacist	During hospitalization and up to 1 month after discharge	Readmission rate, emergency department visit rate	2
Jackson, 2012	27	USA	15	NA	I=5/2 C=5/3	Intensive care	I= 11.0(6.2-13.0) ** C= 11.5(9.2-14.4) **	None	Psychology technician, psychologist, exercise physiologist, social worker, occupational therapist	During hospitalization and up to 3 months after discharge	Physical capacity and performance, cognitive functioning	3
Jepma, 2021	28	Netherlands	306	I=82.5(6.1) C=82.3(6.5)	I=83/70 C=67/86	Older cardiovascular	I= 7.0(4.0-10.0) ** C= 7.0(4.5-10.0) **	Nurse practitioner, physiotherapist	Nurse practitioner, physician, other disciplines not further specified	During hospitalization and up to 6 weeks after discharge	Readmission rate, mortality rate	3
Ko, 2017	29	China	180	I=74.9(7.9) C=74.6(8.6)	I=5/85 C=3/87	Pulmonary	NA	None	Nurse practitioner, physiotherapist, physician	During hospitalization and up to 1 year after discharge	Physical capacity, readmission rate	3

First author, year[5]	Ref. nr.	Country	Sam-ple size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care profession-als involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of inter -ven -tion*
Lainscak, 2013	30	Slovenia	253	I=71.0(9.0) C=71.0(9.0)	I=37/81 C=34/101	Pulmonary	NA	Nurse practitioner, physician, physiotherapist, social worker, and other providers not further specified	Discharge coordinator	During hospitalization and up to 10 days after discharge	Readmission rate, mortality rate	2
Lanzeta, 2016	31	Spain	140	Overall=78.2(NA)	I=20/50 C=25/45	Older patients with multimorbidity, not further specified	NA	Physician, nurse practitioner	Physician, nurse practitioner	During hospitalization and up to 1 year after discharge	Readmission rate, emergency department visit rate	2
Latour, 2006	32	Netherlands	147	I=65.3(15.7) C=62.3(17.5)	I=39/39 C=33/36	Cardiovascular, pulmonary, gastrointestinal, endocrine, infectious diseases, and other conditions not specified	I= 10.1(7.0) C= 13.3(15.99)	Physician, allied health professionals	Nurse practitioner, physician	Within 5 days after discharge and up to 6 months	Physical and mental quality of life, readmission rate	2
Lim, 2003	33	Australia	598	I=76.5(7.0) C=76.8(6.0)	I=187/124 C=164/123	Older patients (medical and surgical, not further specified)	I= 10.0(8.8-11.1) ** C= 10.4(9.5-11.4) **	Community services, not further specified	Nurse practitioner, allied health professionals not further specified	During hospitalization and after discharge, not further specified	Readmission rate, emergency department visit rate	2
Linden, 2014	34	USA	512	I=65.8(12.1) C=67.7(11.8)	I=142/111 C=153/106	Cardiovascular and pulmonary	I=5.1(4.2) C=5.4(3.9)	Physician	Nurse practitioner	During hospitalization and up to 3 months after discharge	Readmission rate, mortality rate	2

First author, year[s]	Ref. nr.	Country	Sam-ple size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care profession-als involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of inter -ven -tion*
Liu, 2023	35	China	100	I=81.6(6.9) C=81.9(7.4)	I=26/24 C=19/31	Older patients with comorbidities, not further specified	NA	None	Nurse practitioner, physician, pharmacist, psychologist, dietitian, rehabilitation therapist	During hospitalization and up to 6 months after discharge	Physical performance, readmission rate	2
Markle-Reid, 2021	36	Canada	99	NA	I=29/18 C=33/19	Older patients with multimorbidity, not further specified	NA	Primary care health and social services providers, not further specified	Nurse practitioner	During hospitalization and up to 6 months after discharge	Depression, anxiety, physical and mental quality of life	2
Markle-Reid, 2023	37	Canada	90	I=68.7(9.5) C=70.9(9.3)	I=19/25 C=17/29	Older patients with stroke and multimorbidity	NA	None	Nurse practitioner, physiotherapist, occupational therapist	During hospitalization and up to 6 months after discharge	Depression, physical and mental quality of life, readmission rate	3
McCorkle, 2000	38	USA	375	NA	I=92/98 C=103/82	Surgical oncology	I= 10.8(10.4) C= 9.6(9.0)	Healthcare settings and providers, not further specified	Nurse practitioner	Within 1 day after discharge and up to 1 month	Physical performance, depression, mortality rate	2
Meyer, 2022	39	Germany	104	NA	I=30/24 C=29/21	Older patients with multimorbidity, not further specified	I= 20.2(13.6) C= 19.4(10.5)	Social worker	Physician, nurse practitioner, dietician, psychologist, therapist, not further specified	During hospitalization and up to 6 months after discharge	Depression, readmission rate, mortality rate	1
Naylor, 2004	40	USA	239	I=76.4(6.9) C=75.6(6.5)	I=71/47 C=66/55	Older cardiovascular	NA	Physician and other providers, not further specified	Physician, nurse practitioner, oharmacist, dietician, social worker, physiotherapist	During hospitalization and up to 3 months after discharge	Health-related quality of life, physical and mental quality of life, readmission rate, patient satisfaction	2

First author, year[5]	Ref. nr.	Country	Sam-ple size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care profession-als involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of inter -ven -tion*
Preen, 2005	41	Australia	189	I=74.8(6.7) C=75.4(7.9) Overall=75.1(10.9)	I=57/34 C=58/40	Pulmonary	I= 11.6(5.7) C= 2.4(7.4)	Physician, community service providers, not further specified	Nurse practitioner	During hospitalization and up to 1 week after discharge	Physical and mental quality of life, patient satisfaction	1
Rich, 1993	42	USA	98	I=80.0(6.3) C=77.3(6.1)	I=38/25 C=20/15	Older cardiovascular	I= 10.5(7.3) C= 9.6(5.8)	None	Nurse practitioner, dietician, physician, social worker	During hospitalization and up to 1 week after discharge	Readmission rate	2
Santana, 2017	43	Canada	1399	I=58.8(17.9) C=59.1(17.9)	I=324/377 C=325/373	Pulmonary, infections, urological, cardiovascular, gastrointestinal, rheumatology, poison, metabolic, and other, not further specified	NA	Community-based providers not further specified	Physician, multidisciplinary team not further specified	During hospitalization for an unspecified time period	Readmission rate, mortality rate	1
Schnipper, 2021	44	USA	1657	NA	I=540/438 C=364/315	Medical and surgical patients, not further specified	NA	Nurse practitioner	Nurse practitioner, physician assistant, pharmacist	During hospitalization and up to 1 month after discharge	Readmission rate	2
Thorsen, 2005	45	Sweden	54	I=71.0(NA) C=71.0(NA)	I=15/15 C=10/14	Neurological	I= 14.0(NA) C= 30(NA)	None	Occupational therapist, physiotherapist, speech and language therapist	After discharge and up to 2 weeks	Physical capacity, cognitive functioning	3

First author, year[$]	Ref. nr.	Country	Sample size	Age (mean, SD)	Gender F/M	Patient population/ type of disease or condition	Average LOS of index admission (mean, SD or median IQR**)	Community care professionals involved	Hospital professionals involved	Start and duration of the intervention	Outcomes measured	Type of intervention*
Thygesen, 2015	46	Denmark	531	I=77.8(7.9) C=77.7(7.2)	I=131/139 C=124/137	Older patients with comorbidities, not further specified	Overall= 5.0(3.0-11.0); I= 5.0(3.0-10.0) ** C= 6.0(3.0-12.0) **	Nurse practitioner, physician	Physician	During hospitalization and up to 2 months after discharge	Readmission rate	2
Van Spall, 2019	47	Canada	2494	I=77.8(12.4) C=77.6(11.9)	I=544/560 C=714/676	Cardiovascular	I= 6.0(4.0-10.0) ** C= 6.0(4.0-10.0)**	Nurse practitioner, physician, multidisciplinary referrals, not further specified	Nurse practitioner	During hospitalization and up to 6 weeks after discharge	Readmission rate, mortality rate, emergency department visit rate	2
Visperas, 2021	48	USA	514	I=66.0(9.0) C=65.0(10.0)	I=102/93 C=113/91	Orthopedic	I=1.5(0.8) C=1.4(0.8)	None	Physician assistant, nurse practitioner, not further specified	During hospitalization and up to 3 months after discharge	Readmission rate, patient satisfaction	2
Zimmerman, 2021	49	USA	40	NA	I=10/9 C=8/13	Neurological	I= 5.9(4.0-9.6) ** C= 4.0(2.0-10.4)**	Not specified	Nurse practitioner, physician, physiotherapist, occupational therapist, speech and language therapist	During hospitalization	Patient satisfaction, emergency department visit rate, patient satisfaction	2

NA: Not available; I: Intervention group; C: Control group

* Interventions were organized into 3 categories according to their content. 1: Development of a care plan and referral to community care providers; 2: Similar interventions to category 1 with, in addition, a case manager coordinating patient care within and between settings; 3: Entire transitional care provided by a dedicated multidisciplinary team in-hospital and post-discharge.

** Estimate reported as median and interquartile range

$ The full references of the included studies are provided in supplementary material Appendix 6

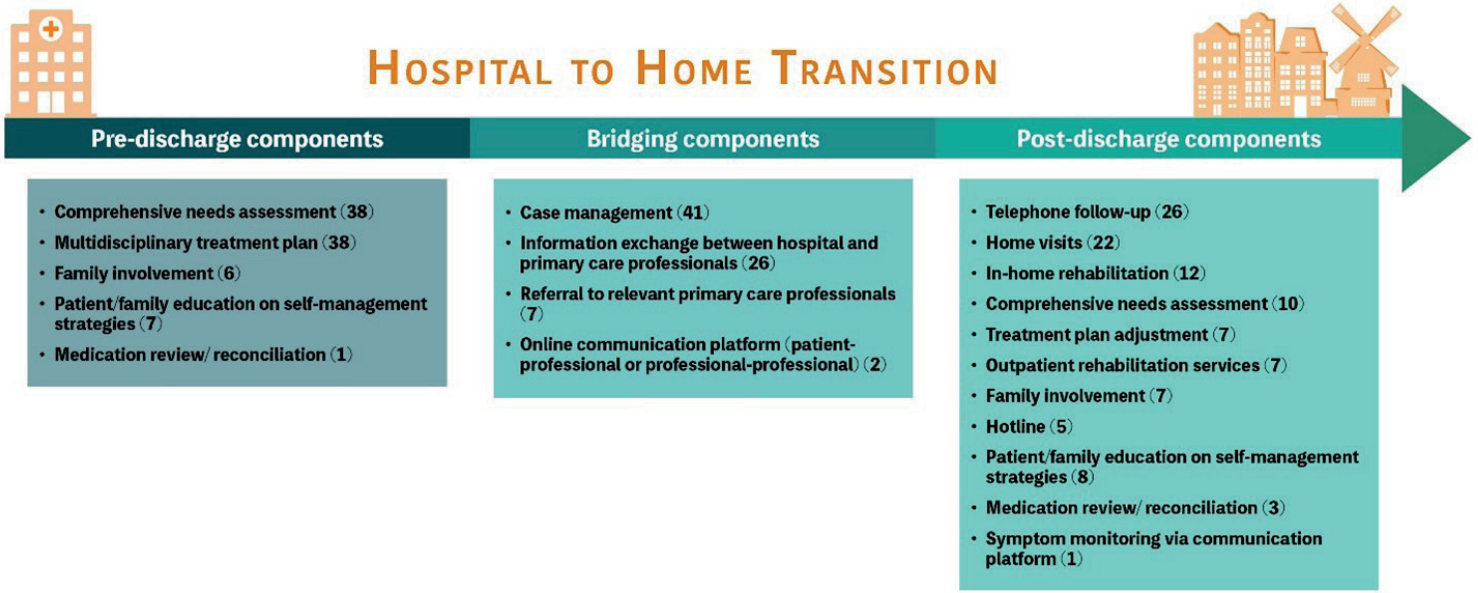


Figure 2: Components of the transitional care interventions per discharge phase

Regarding the types of interventions, five studies (10%) assessed type 1 interventions (consisting of a care plan and referrals to relevant community care professionals), 30 studies (61%) assessed type 2 interventions (comprising a case manager coordinating care within and between settings), and 14 studies (29%) assessed type 3 interventions (offering an entire recovery trajectory delivered by dedicated multidisciplinary teams). Most interventions were coordinated by hospital nurse practitioners (23 studies, 47%) or by a hospital multidisciplinary team comprising medical, nursing, and allied health professionals (11 studies, 22%) (Table 1; Figure 2; Supplementary material Appendix 2).

Risk of bias and certainty of the evidence

Four RCTs and 1 cluster RCT (10%) were assessed as "low risk", 22 RCTs and three cluster RCTs (51%) of "some concerns", and 19 RCTs (39%) as "high risk". Generally, studies were assessed as "high risk" because outcome data were missing for more than 5% of the participants, and/or they did not report appropriate statistical or sensitivity analyses to correct for bias introduced by these missing data. In addition, due to the nature of the interventions and the outcomes measured (patient-reported outcomes), which are difficult to blind to patients, assessors, and people delivering the interventions, many studies were assessed as "some concerns" with regards to the second domain of the RoB 2 tool, leading to a low number of papers assessed as low risk of bias (Figures 3 and 4). The certainty of evidence across all comparisons was graded as very low to high. Reasons for downgrading the certainty of evidence scores included studies rated as high risk of bias, high heterogeneity observed, wide confidence intervals, and potential for publication bias (Table 2).

Results of the meta-analyses and narrative syntheses

The supplementary material, Appendix 3, provides all forest and funnel plots for each comparison, including subgroup analyses. Appendix 4 provides the complete ICEMAN assessments of subgroup effects credibility.

Readmission rate

Thirty-four studies involving 20,954 participants assessed readmission rate as an outcome (references 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 14, 16, 17, 18, 19, 24, 26, 28, 29, 30, 31, 32, 33, 35, 37, 39, 40, 42, 43, 44, 46, 47, 48 Table 1). There was "low" certainty that multidisciplinary transitional care interventions decreased the risk of all-cause hospital readmissions (RR, 0.88; 95% CI, 0.80 to 0.96) compared with usual care (Table 2) due to *inconsistency* (I^2=56%) and possible

publication bias (Egger P=0.001, Supplementary material Appendix 3). Because the heterogeneity test suggested moderate heterogeneity across studies, the results presented are those of the random effect model. One study could not be pooled for meta-analysis (reference 34 Table 1). This study found no difference in readmission rate between intervention and usual care.

Mortality rate

Across 15 studies (references 1, 2, 8, 11, 12, 14, 16, 21, 28, 30, 34, 38, 39, 43, 47 Table 1), including 9,773 participants, there was "high" certainty that multidisciplinary transitional care interventions were associated with a mortality reduction (RR, 0.92; 95% CI, 0.84 to 1.01; I^2=27%) (Table 2 and Supplementary material Appendix 3). There was no indication of *publication bias* (Egger P=0.101, Supplementary material Appendix 3).

Emergency department visit rate

Pooling data from 11 studies (references 3, 5, 6, 9, 14, 24, 26, 31, 33, 47, 48 Table 1) including 11,853 participants, we found "very low" certainty that multidisciplinary transitional care interventions were associated with an emergency department visits reduction (RR, 0.93; 95% CI, 0.57 to 1.51; I^2=98%) compared to usual care due to *inconsistency* very serious *imprecision* (Table 2 and Supplementary material Appendix 3). There was no indication of *publication bias* (Egger P=0.419, Supplementary material Appendix 3). One study could not be pooled for meta-analysis (reference 34 Table 1). This study found no difference in emergency department visit rate between intervention and usual care.

Health-related quality of life

Health-related quality of life measurements obtained with several self-reported questionnaires were pooled from three studies (references 1, 15, 40 Table 1) including 355 participants. All self-reported questionnaires used in the studies are reported in the Supplementary material, Appendix 5.

There was "very low" certainty that multidisciplinary transitional care interventions increased health-related quality of life due to serious *inconsistency* and very serious *imprecision* (SMD, 0.21; 95% CI, -0.49 to 0.92, I^2=99%) (Table 2 and Supplementary material Appendix 3). There was no publication bias (Egger P=0.911, Supplementary material Appendix 3).

Three studies (references 12, 22, 25 Table 1) could not be pooled for meta-analysis. One of these studies reported significant improvements regarding

health-related quality of life in the intervention group compared to usual care (reference 12 Table 1). In contrast, the other two studies reported no difference (references 22, 25 Table 1).

Physical and mental quality of life

Physical and mental quality of life were measured post-intervention in nine studies (references 9, 10, 13, 15, 32, 36, 37, 40, 41 Table 1), involving 1050 participants, through self-reported questionnaires (Supplementary material, Appendix 5).

There was "moderate" certainty that multidisciplinary transitional care interventions increased physical quality of life due to *inconsistency* and *imprecision* (SMD, 0.54; 95% CI, -0.06 to 1.15, I^2=100%) (Table 2 and Supplementary material Appendix 3). There was no publication bias (Egger P=0.285, Supplementary material Appendix 3).

There was "moderate" certainty that multidisciplinary transitional care interventions substantially increased mental quality of life due to *inconsistency* (SMD, 0.44; 95% CI, -0.08 to 0.96, I^2=100%) (Table 2 and Supplementary material Appendix 3). There was no publication bias (Egger P=0.497, Supplementary material Appendix 3).

Psychological distress

Five studies (references 1, 36, 37, 38, 39 Table 1), including 693 participants, provided "very low" certainty evidence that multidisciplinary transitional care interventions were associated with a higher depression score compared with usual care (SMD, -0.06; 95% CI, -0.25 to 0.13, I^2=99%) due to *inconsistency* and very serious *imprecision* (Table 2 and Supplementary material Appendix 3). There was no publication bias (Egger P=0.485, Supplementary material Appendix 3).

Two studies (references 4, 36 Table 1), including 219 participants, provided "very low" certainty evidence that multidisciplinary transitional care interventions increased anxiety due to *inconsistency* and very serious *imprecision* (SMD, 0.43; 95% CI, -2.06 to 2.92, I^2=99%) (Table 2 and Supplementary material Appendix 3).

Physical performance and capacity

Physical performance was measured post-intervention in eight studies (references 9, 13, 15, 23, 27, 35, 38, 39 Table 1), involving 1,163 participants, through self-reported questionnaires (Supplementary material, Appendix 5).

Physical capacity was measured in four studies (references 11, 27, 29, 45 Table 1), involving 423 participants.

There was "low" certainty that multidisciplinary transitional care interventions increased physical performance (SMD, 0.49; 95% CI -0.11 to 1.10, I^2=89%) due to *inconsistency* and *publication bias* (Egger P=0.029, Table 2 and Supplementary material Appendix 3). Furthermore, there was "low" certainty that multidisciplinary transitional care interventions increased physical capacity (SMD, 0.59; 95% CI, -0.06 to 1.24, I^2=71%) due to *inconsistency* and *risk of bias* (all studies were assessed as high-risk) (Table 2 and Supplementary material Appendix 3). Five studies could not be pooled for meta-analysis (references 1, 12, 20, 21, 23 Table 1). These studies found a direction an effect favoring the intervention group compared to usual care.

Cognitive functioning

Cognitive functioning was measured in two studies (references 27, 45 Table 1), but could not be pooled for meta-analysis. Of them, Jackson et al. (reference 27 Table 1) reported improvements at follow-up, while similar median follow-up measurements were observed by Thorsen et al. (reference 45 Table 1) in the intervention group compared to usual care.

Patient satisfaction

Pooling data from five studies (references 15, 23, 24, 40, 48 Table 1) involving 1,171 participants, there was "low" certainty that multidisciplinary transitional care interventions increased patient satisfaction due to *inconsistency* and *risk of bias* (SMD, 0.49; 95% CI, -0.14 to 1.12, I^2=92%) (Table 2 and Supplementary material Appendix 3). The results of two studies (references 41, 49 Table 1) could not be pooled for meta-analysis. Both studies found greater satisfaction with the discharge process in the intervention group compared to usual care.

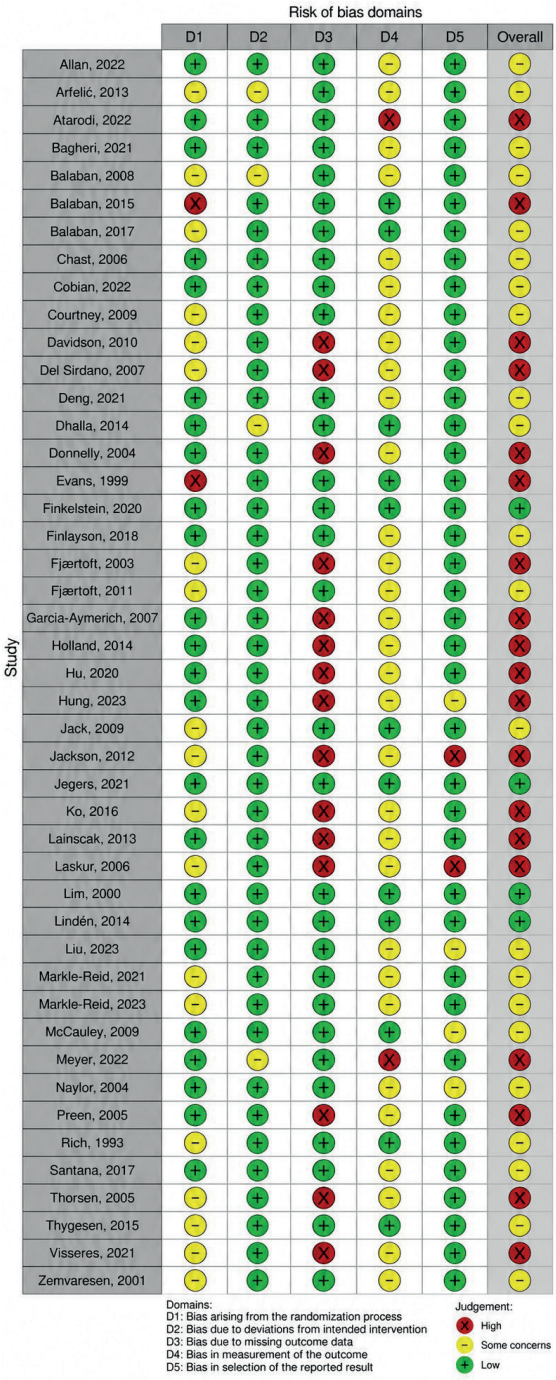


Figure 3: Risk of bias assessment with the Cochrane tool (Rob 2)- RCT

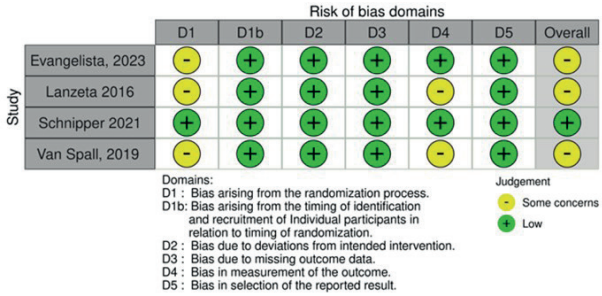


Figure 4: Risk of bias Risk of bias assessment with the Cochrane tool (Rob 2) – Cluster RCT

Sensitivity and subgroup analyses

For each outcome, we performed a sensitivity analysis by excluding high-risk-of-bias studies. Additionally, we performed subgroup analyses to investigate whether different intervention types had different effects on readmissions and health-related outcomes. These intervention types were defined as follows: 1) transitional care plans with referrals to relevant primary care professionals, 2) case-managed interventions overseeing the entire transition process, and 3) more complex interventions led by a multidisciplinary team, including comprehensive recovery pathways, outpatient rehabilitation. and home visits.

We do not report the sensitivity and subgroup analysis results for readmission rate, mortality rate, emergency department visit rate, health-related quality of life, physical and mental quality of life, psychological distress, physical capacity, or patient satisfaction. This decision was based on GRADE recommendations: i.e., sensitivity and subgroup analyses ought not to be performed if either the Q test P-values exceed 0.1, indicating no significant differences between subgroups and overall effects, or the ICEMAN credibility rating for the subgroup analyses was "low" or "very low." Please note that a "low" or "very low" credibility rating was generally assigned when at least one subgroup included fewer than three studies, a threshold considered insufficient for drawing reliable conclusions.

Table 2: Evidence quality (GRADE and ICEMAN assessment)

Outcome	# studies	N	Effect (95% CI)	Heterogeneity (I^2)	Reason(s) for downgrading	Certainty of the evidence	$P_{subgroup}$[$]	ICEMAN subgroup credibility**
Hospital readmission rates								
Overall	34	20,954	RR 0.88 (0.80; 0.96) *	56%	Serious inconsistency, publication bias	Low		
Subgroup Risk of bias							0.564	
Subgroup Type							0.062[$]	Low**
Mortality rates								
Overall	15	9,773	RR 0.92 (0.84; 1.01)	27%	-	High		
Subgroup Risk of bias							0.582	
Subgroup Type							0.376	
Emergency department visit rates								
Overall	11	11,853	RR 0.93 (0.57; 1.51)	98%	Serious inconsistency, serious imprecision	Very low		
Subgroup Risk of bias							0.320	
Subgroup Type							0.244	
Health-related quality of life								
Overall	3	355	SMD 0.21 (-0.49; 0.92)	99%	Serious inconsistency, very serious imprecision	Very low		
Subgroup Risk of bias							0.000[$]	Low**
Subgroup Type							0.000[$]	Low**

Outcome	# studies	N	Effect (95% CI)	Heterogeneity (I^2)	Reason(s) for downgrading	Certainty of the evidence	$P_{subgroup}$[$]	ICEMAN subgroup credibility**
Physical quality of life								
Overall	9	1050	SMD 0.54 (-0.06; 1.15)	100%	Serious inconsistency	Moderate		
Subgroup Risk of bias							0.008[$]	Low**
Subgroup Type							0.798	
Mental quality of life								
Overall	9	1050	SMD 0.44 (-0.08; 0.96)	100%	Serious inconsistency	Moderate		
Subgroup Risk of bias							0.073[$]	Low**
Subgroup Type							0.961	
Depression								
Overall	5	693	SMD -0.06 (-0.25; 0.13)	99%	Serious inconsistency, very serious imprecision	Very low		
Subgroup Risk of bias							0.000[$]	Low**
Subgroup Type							0.000[$]	Low**
Anxiety								
Overall	2	219	SMD 0.43 (-2.06; 2.92)	100%	Serious inconsistency, very serious imprecision	Very low		
Physical performance								
Overall	8	1163	SMD 0.49 (-0.11; 1.10)	89%	Serious Inconsistency, publication bias	Low		

Outcome	# studies	N	Effect (95% CI)	Heterogeneity (I^2)	Reason(s) for downgrading	Certainty of the evidence	$P_{subgroup}$[$]	ICEMAN subgroup credibility**
Subgroup Risk of bias							0.741	
Subgroup Type							0.046[$]	
Type 2 interventions	3	581	SMD -0.08 (-0.63; 0.47)	43%	Very serious imprecision, publication bias	Very low		Moderate
Type 3 interventions	5	582	SMD 0.83 (0.02; 1.65) *	85%	Serious inconsistency, publication bias	Low		
Physical capacity								
Overall	4	329	SMD 0.59 (-0.06; 1.24)	71%	Serious inconsistency, serious risk of bias	Low		
Subgroup Risk of bias							All studies were assessed as high-risk	
Subgroup Type							All studies were of type 3	
Patient satisfaction								
Overall	5	1171	SMD 0.49 (-0.14; 1.12)	92%	Serious inconsistency, serious risk of bias	Low		
Subgroup Risk of bias							0.980	
Subgroup Type							0.621	

* Statistically significant

** If the credibility of the subgroup effect was very low or low, only the overall estimate was reported

[$] If the P-value of the interaction test (Q-test) was 0.1 or higher, no further exploration of subgroup effect was conducted

Physical performance

The ICEMAN credibility of the subgroup analysis per intervention type for physical performance was “moderate” (Appendix 4), and hence a subgroup analysis was performed. This analysis revealed “low” certainty (GRADE)—due to inconsistency and potential publication bias—that the magnitude of the effect was larger than the overall effect and statistically significant only for type 3 interventions compared with usual care (SMD, 0.83; 95% CI, 0.02 to 1.65, I^2=85%) (Table 2 and Appendix 3).

DISCUSSION AND IMPLICATIONS

This systematic review and meta-analysis aimed to identify, critically appraise, and synthesize the current body of RCTs investigating the impact of multidisciplinary transitional care interventions addressing patients' complex care needs during hospital-to-home transitions on hospital readmissions and health-related outcomes. We found that multidisciplinary transitional care interventions were associated with a reduction in hospital readmissions. However, the certainty of the evidence was low due to inconsistency across studies and possible publication bias. Furthermore, there was “high” certainty of an overall relative reduction in mortality, and multidisciplinary transitional care interventions were associated with increased physical (“moderate” certainty) and mental quality of life (“moderate” certainty). There was also evidence of improved physical performance, particularly with type 3 interventions, and there was an overall trend towards improved physical capacity and patient satisfaction.

Several systematic reviews examined the effects of mono- and multidisciplinary transitional care interventions aimed at improving communication between healthcare professionals and (older) patients with cardiovascular or general medical conditions or post-surgery (12, 30-32). These studies showed relative risk reductions for mortality and readmissions of up to 18% and 22%, respectively, consistent with our findings, although our results led to somewhat smaller effect magnitudes. Moreover, their results regarding emergency department visits were – similar to our results – inconclusive. These studies, however, did not assess other outcomes, such as physical, cognitive, and psychosocial status. Furthermore, the interventions evaluated in these reviews were often monodisciplinary, consisting only of a nurse practitioner in charge of patient follow-up via telephone, digital applications, home visits,

or outpatient clinic visits. This makes their findings difficult to compare with ours since we focused on multidisciplinary interventions specifically.

Tyler et al.(2023) recently conducted a comprehensive review of mono- and multidisciplinary transitional care interventions involving 97,408 participants with a wide range of conditions or diseases from 126 RCTs conducted worldwide (17). They investigated whether the effectiveness of transitional care interventions differed depending on the number of components they contained. They found that interventions with fewer components were associated with relative reductions in hospital readmissions between 18% and 55% compared with usual care, while this was less pronounced in more complex interventions. An explanation for this might be that interventions with fewer components are easier to implement and execute. On the other hand, interventions with more components were better for improving patient satisfaction. However, unlike in our meta-analysis, the interventions they evaluated did not always address patients' physical, cognitive, and/or psychosocial needs but often only focused on improving medication adherence. All interventions included in our analysis were complex by nature, as they involved multidisciplinary approaches. Thus, we did not perform subgroup analyses based on complexity; instead, we categorized interventions by content to explore whether different types of interventions had different effects on readmissions and health-related outcomes. For most comparisons, we found no significant differences between intervention types. However, for physical performance, type 3 interventions (i.e., led by a multidisciplinary team and including comprehensive recovery pathways, outpatient rehabilitation. and home visits) appeared more effective than type 2 interventions (i.e., case-managed interventions overseeing the entire transition process), though the certainty of the evidence was "low" due to inconsistency and potential publication bias. This finding might be explained by differences in patient populations: type 3 interventions may have been more frequently provided to patients with more complex care needs, who thus had greater potential for improvement in physical performance than those receiving type 2 interventions. In this respect, our findings build on to those of Tyler et al. (2023) by providing a more specific understanding of complex, multidisciplinary transitional care interventions.

Despite the positive outlook of our findings regarding readmissions and mortality reduction and improving health–related outcomes, we observed severe heterogeneity in the effect sizes across studies, suggesting that some multidisciplinary transitional care interventions are more effective than others. This heterogeneity can be partially explained by the variability in the interventions' content and how the interventions were provided,

which we could not assess because of a lack of statistical power. In a recent comprehensive meta-synthesis, including 53 qualitative studies conducted globally, we examined the experiences and needs of patients, family members, and healthcare professionals during hospital-to-home transitions (9). We found that experiences and needs vary widely from one patient to another and that there is a crucial need for more tailored support and information provision. Future research should clarify how to tailor multidisciplinary transitional care interventions to specific environments, settings, and populations to optimize their impact on healthcare utilization and health outcomes.

Strengths and limitations

This systematic review contributes to the current knowledge about the effectiveness of multidisciplinary transitional care interventions on hospital readmission and health-related outcomes. It included an extensive systematic search, a thorough meta-analysis, and we identified many studies, increasing the reliability of the findings. However, some limitations to our study can be identified. First, due to the large number of researchers participating in the selection process, uniformity in article selection may have been negatively affected. To minimize this selection bias, we used sample checks and held meetings during the screening phase to monitor and guide the process. Second, substantial heterogeneity was observed across studies, possibly due to the variability of the interventions provided by participants. We minimized this issue by grouping interventions into three types and performing subgroup analyses. The duration of the interventions also varied widely, from a few days up to a year after discharge, making it difficult to compare the interventions. Despite this variability in interventions content, we pooled the data to allow for broader trend identification, and we employed random effects models to generate more generalizable conclusions. Finally, multidisciplinary transitional care interventions may affect more vulnerable populations, such as frail older people, differently than younger populations. The subgroup analysis we performed according to patient populations was inconclusive, as only a few trials investigated these populations.

CONCLUSIONS

The findings of this systematic review and meta-analysis suggest that multidisciplinary transitional care interventions addressing patients' complex care needs offer a viable solution to improve their quality of life and physical performance while reducing hospital readmissions and mortality. Given the

varying effects observed across studies, we recommend tailoring strategies to implement such interventions to the environments, settings, and populations in which they are implemented to maximize their impact on health-related outcomes. A systematic and thorough needs assessment before implementing a transitional care intervention might improve its chances of success. However, further research is needed to determine how to tailor strategies to implement these interventions successfully.

Data availability: All data supporting the findings of this study are available within the article and its supplementary material. The protocol was registered in PROSPERO (CRD42023421423).

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APPENDICES





Chapter 6

Indicators for allied healthcare needs after hospital discharge – A qualitative study

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ABSTRACT

Objective

To identify key indicators hospital-based allied healthcare professionals can use to determine patients' allied healthcare needs after hospitalization.

Methods

Semi-structured interviews were conducted with allied healthcare professionals at a Dutch hospital. Findings were triangulated in multidisciplinary focus groups and analyzed thematically using Braun & Clarke. Indicators were categorized using the International Classification of Functioning, Disability and Health (ICF).

Results

Fourteen professionals were interviewed and nine joined focus groups. Seventeen indicators were identified across ICF components: Health condition, Body functions and structures, Activities, External factors, and Personal factors. Three themes emerged regarding the identification process: 1) Timing, 2) Uniformity, and 3) Roles and collaboration. Sample questions were developed to support use in clinical practice.

Conclusions

Key indicators were identified to help standardize screening for allied healthcare needs post-hospitalization. Future research should focus on integrating these into a user-friendly tool—such as a checklist or decision aid—for routine use during discharge planning.

INTRODUCTION

As the average age is rising in the Netherlands, the healthcare demand will become more complex due to the rising prevalence of multimorbidity (1). Therefore, it is essential to optimize the coordination and continuity of care as patients transfer between different locations or levels of care (e.g. from hospital-to-home) (2, 3). This can be achieved through transitional care interventions (i.e. multidisciplinary interventions including allied healthcare), which involve actions designed to ensure seamless and effective patient care during these transitions.

Transitional care interventions help maintain patients' independence and improve their quality of life after hospitalization (4-6). Efficient transitional care can also improve discharge readiness and reduce readmissions (7, 8). To date, coordination and collaboration between settings is often lacking when multiple allied healthcare professionals are involved (9). As a result, patients who need transitional care are at risk of adverse events due to the absence of care continuity and coordination (5, 10).

Previous research underscores the importance of timely and correctly identifying patients in need of allied healthcare after hospitalization (11). This means that early assessment procedures and clear referral pathways should be in place to ensure patients receive appropriate support from allied health professionals—such as physical therapists, occupational therapists, dietitians, and speech-language therapists—to optimize recovery, prevent functional decline, and reduce the risk of hospital readmission.

Currently, there is no overview of which indicators are important for determining those needs. Although several potentially relevant screening tools exist, (12-15) they primarily focus on frailty or general care needs and are often limited to a single healthcare setting. This study builds on prior work by identifying key indicators specific to allied healthcare needs that are applicable across settings, thereby providing a foundation for more practical screening in transitional care. While tools such as the Clinical Frailty Scale (CFS) and InterRAI are commonly used in our setting, they fall short in capturing the specific functional and rehabilitation needs that emerge after hospital discharge because they are primarily designed to assess overall frailty, risk stratification, or long-term care planning, rather than to identify short-term, allied health interventions required for optimal recovery and reintegration into daily life (13, 14). Given the lack of consensus on key indicators for allied healthcare needs after hospitalization, this study aims to fill this gap and improve hospital-to-home transitions. Therefore, the primary aim of this study is to identify

key indicators that hospital-based allied healthcare professionals can use to determine patients' allied healthcare needs after hospitalization. Additionally, the study will explore the process future healthcare professionals can follow to determine these indicators.

MATERIALS AND METHODS

This qualitative study was conducted at Amsterdam University Medical Centers (AUMC), a large academic teaching hospital in Amsterdam, the Netherlands. The Medical Ethics Committee of the AUMC provided a waiver for this study (METC 2023.0119). Written informed consent was obtained from all participants. This study was conducted and reported in accordance with the Consolidated Criteria for Reporting Qualitative Research checklist (COREQ) (16).

Participants were included in semi-structured interviews and multidisciplinary focus groups, all conducted face-to-face within the hospital. Participants were eligible if they: 1) were working at AUMC as a physical therapist, occupational therapist, speech- and language therapist, dietician or nurse, no minimum duration in the current position was required, and 2) were working at the intensive care unit, internal medicine, trauma surgery or oncologic surgery. These hospital wards were chosen, because they include a relatively large number of patients with complex, and hence transitional, care needs. We selected these participants because, in our context, the allied healthcare professionals on those wards play a crucial role in addressing allied healthcare needs during hospitalization.

Participants were recruited through purposive sampling via email and face-to-face interactions, aiming to obtain a heterogeneous sample in terms of profession and work experience. The sample size of n=15 was determined based on the principle of data saturation, where no new themes or insights emerged from the interviews after this number of participants (17). All participants who were interviewed, were asked to participate in a multidisciplinary focus group as well.

Data collection was carried out between January and April 2024. Interviews were conducted by IB, who was already familiar with the participants. Multidisciplinary focus groups were facilitated by IB, JvG, SW, and RC, who had a background in Human Movement Sciences (SW) and Physical Therapy (IB, JvG, SW, RC). All members were trained in qualitative research and JvG, SW and RC had previous experience with conducting qualitative research.

An interview guide was developed through iterative discussions among the research team (IB, JvG, SW, and RC). The interview guide included an introduction, a discussion of the current situation and potential identification tools, an in-depth exploration of identification practices, and a closing segment. It was pilot tested and revised once prior to data collection. See Appendix I for the final interview guide. Before the interviews, participants received an overview of three screening tools (InterRAI, CFS, COMPRI), to enhance the depth of the interviews by providing more context on the topic. After the interviews, multidisciplinary focus groups were conducted with the same set of participants, to triangulate the findings of the interviews. The focus group guide drew upon insights from the interviews, aiming to delve deeper into the topics that emerged during those interviews, see Appendix II for the focus group guide. In addition to the qualitative data, demographic data were collected including gender, age, years of working experience, and profession.

All interviews and focus groups were audio recorded (Philips Voice Recorder App) and were transcribed verbatim and anonymized by IB. Data analysis was conducted using MAXQDA 2022 software (VERBI Software, 2021). The six-step Framework Method, was used to manage and analyse the data (18, 19):

The six-step Framework Method:

1. IB re-read and transcribed the data and took notes.
2. IB and JvG started individually with open coding of four interviews. The data was divided into fragments, resulting in a list of codes. Before proceeding, IB and JvG discussed the codes until consensus was reached.
3. A coding tree was developed, in which codes were grouped together into core categories. The core categories were identified through discussion between IB, JvG and SW.
4. IB independently coded the remaining transcripts using the initial coding tree. After coding all transcripts, IB and JvG revised the coding tree to incorporate new codes, together with SW and RC. The process of applying and refining was repeated until no new codes were generated.
5. The data was charted using a coding table, summarizing codes, categories and themes, accompanied by quotes.
6. During the interpretation of the data, the coding table was used together with the notes made during the interviews. The process of interpretation involved an iterative approach, requiring ongoing discussions between IB, JvG. SW and RC to assess the significance and robustness of identified themes.

The indicators were mapped to the International Classification of Functioning, Disability, and Health (ICF). The ICF is a framework designed to describe and

organize information on functioning and disability, providing a standardized language and a conceptual foundation for defining and measuring health and disability (18). In this study, the ICF was employed to categorize the indicators relevant to the assessment of allied healthcare needs after hospitalization. Both inductive and deductive approaches were used to identify these indicators. A deductive approach was used to map indicators to the predefined categories of the ICF, while an inductive approach was applied during data collection and analysis to identify emerging themes and new indicators from participants' responses.

In collaboration with the research group, a list of sample questions was developed following data analysis to help future healthcare professionals assessing the indicators for allied healthcare needs. This list of questions was continuously revised and presented to researchers and allied healthcare professionals and can be found at the end of the results section.

The data analysis was conducted in Dutch. The English translations of themes, categories, and quotes were crosschecked and adjusted by a native English speaker. Quantitative demographic data were analyzed descriptively in Microsoft Excel, with categorical data summarized as frequencies and percentages, and continuous data analyzed using descriptive statistics for non-normally distributed data.

To ensure validity of the study and that perspectives of the participants were accurately portrayed, member checks were implemented after the interviews (20). That is, IB provided the participants with a summary of the interview transcript and requested their feedback. We did not provide a member check for the focus groups.

RESULTS

Fourteen semi-structured interviews and two multidisciplinary focus groups were conducted, see Table 1 for demographic information of the participants. Twenty healthcare professionals were approached for participation in the study, of whom fourteen responded and participated in the interviews (i.e. response rate: 70%). Six of these participants were unable to join a focus group due to scheduling conflicts. Additionally, one participant who did not take part in the interviews was included in a focus group. In total, two focus groups were conducted, one with five participants and one with four. Interviews averaged 45 minutes (range: 35–55), and focus groups lasted 60 minutes. One participant provided feedback during member checking, which did not affect the results.

Seven participants confirmed the accuracy of their transcripts and indicated they had no further comments. The focus groups validated findings from the interviews and did not introduce new themes.

Table 1: Baseline characteristics of healthcare professionals

Demographic information		
	Interviews	**Focus groups**
Participants, n	14	9
Age, median years (range)	43 *(25-54)*	39 *(25-54)*
Female, n	10	8
Profession, n		
• Physical therapist	6	4
• Occupational therapist	4	2
• Dietician	3	1
• Speech- and language therapist	1	1
• Nurse	-	1
Working experience, median years (range)	15 *(2-32)*	12 *(2-31)*

Abbreviations: n=number

Health condition (disorder/disease)		
Trajectory and complexity of the hospitalization Process of recovery		
Body functions and structures	**Activities**	**Participation**
Current functioning and pre-hospitalization functioning Exercise tolerance functions Cognitive functions Mobility Mobility of joint functions Nutritional status	Activities of daily living Self-care	
External factors		**Personal factors**
Living with a partner Caregiver network Social support network Home environment Insurance coverage Financial status		Specific request for help Presence of rehabilitation goals Receptiveness Motivation Coping strategies

Figure 1: Indicators mapped in the ICF

Indicators for allied healthcare needs

Indicators for evaluating allied healthcare needs were categorized under the "Health condition", "Body functions and structures", "Activities", "External

factors", and "Personal factors" components of the ICF, as shown in figure 1. These components can be considered themes and will be discussed in detail below, supported by illustrative quotes. No indicators could be mapped to the "Participation" component of the ICF.

Health condition - As for the "Health condition" component, participants provided us with indicators related to the patients' *trajectory and complexity of the hospitalization* as well as the *process of recovery*. Participants highlighted that a patients' functional status can fluctuate throughout their hospital stay, due to illness, treatments or surgeries. This can pose challenges when determining allied healthcare needs. Shortly after surgery, a patient may need assistance with daily activities and may be less active. However, a few days later, they might become more active and less dependent. This is portrayed by the following quote:

> *"In the hospital, patients can sometimes improve drastically or go the other way around. And you really see that a lot on our ward, there's a lot of fluctuation in the patients' journey.*" (Participant 10, physical therapist)

Additionally, according to our participants, patients with a complex and longer hospital stay are more likely to require allied healthcare after hospitalization as illustrated by the following quote:

> *"If many allied healthcare disciplines are already involved during hospitalization and it is a lengthy and complex process, you can almost assume that it will need to be continued somewhere else.*" (Participant 3, physical therapist)

Body functions and structures - As for the "Body functions and structures" component, participants provided us with indicators related to the patients' *current functioning and pre-hospitalization functioning*, *exercise tolerance functions*, *cognitive functions*, *mobility*, *mobility of joint functions* and *nutritional status*.

Participants emphasized the importance of understanding the relationship between a patient's *current and pre-hospitalization functioning*, as a decline in physical functioning increases the likelihood of a patient needing allied healthcare after discharge. They also noted that a significant decline may indicate frailty, which is associated with adverse outcomes such as prolonged hospital stay, mortality, and readmission. Considering the patient's overall condition helps healthcare professionals make more accurate assessments

of post-discharge needs, thereby improving decision-making regarding allied healthcare. This is illustrated by the following quote:

> *"If you follow a patient for the entire admission, you tend to have better insight as to how someone came in. Therefore, you can make a better estimate of what is needed after hospitalization."* (Participant 3, physical therapist)

Participants identified *exercise tolerance functions*, *cognitive functions*, *mobility* (with or without walking aids), *mobility of joint functions*, and *nutritional status* as important indicators for identifying allied healthcare needs. Given the wide focus of these indicators, maintaining a comprehensive view of the patient is essential, as portrayed by the following quote:

> *"If someone doesn't have tube feeding but does have problems swallowing, then that would make them a candidate for allied healthcare after hospitalization. So, that is the clinical situation and the medical situation. I look further then only my test."* (Participant 4, speech- and language therapist)

Activities - As for the "Activities" component, participants provided us with indicators related to *activities of daily living* and *self-care*.

Healthcare professionals aim to assess patients' ability to manage at home, including tasks like meal preparation and answering the doorbell. This is illustrated by the following quote:

> *"You need to pay attention to if someone can take care of themselves, if someone can go to the toilet independently, can get some food or can call for help in case of emergency."* (Participant 5, occupational therapist)

Participants emphasized that *dependence in activities of daily living* and *self-care* do not necessarily imply completing tasks independently; support from (informal) caregivers can also play a role. When adequate support is available, patients may be able to safely return home and carry out these activities with assistance.

External factors - As for the "External factors" component, participants provided us with indicators related to *living with a partner*, *caregiver network*, *social support network*, *home environment*, *insurance coverage* and *financial status*.

Knowledge about the patients' *social support network* (e.g., friends and informal caregivers) and *home environment* (e.g., location of the bedroom and stairs)

is important, because both are likely to influence the need for allied healthcare after hospitalization. For example, the existence of a strong *social support network* can improve the transition from hospital-to-home, whereas the lack thereof might lead to difficulties with activities of daily living and unplanned readmissions. This was illustrated by the following quote:

> *"I regularly check, how is the patient's [social support] network? Is someone alone, do they have a partner or at least a good network? This makes a difference; can someone go home or not? And how much help is available or is even needed?"* (Participant 6, occupational therapist)

The patient's ability to continue receiving allied healthcare after discharge is influenced by their *insurance status*. Specifically, ongoing allied healthcare can be costly, particularly when multiple allied health professionals are involved and the expenses must be paid out of pocket. When patients lack insurance coverage for allied healthcare in community care, participants frequently observe that patients avoid scheduling appointments with these professionals.

> *"Of course, I cannot force someone or inspect their financial status. If it is truly unfeasible [to continue allied healthcare in community care], then it simply cannot be done."* (Participant 10, physical therapist)

Personal factors - As for the "Personal factors" component, participants provided us with indicators related to *specific request for help*, *presence of rehabilitation goals*, *receptiveness*, *motivation* and *coping strategies*.

Participants indicated that certain prerequisites are necessary to identify allied healthcare needs following hospitalization. One such prerequisite is the *presence of rehabilitation goals*, which should be formulated collaboratively based on input from both healthcare professionals and the patient. This approach is consistent with the principles of patient-centered care. When a patient formulates a specific treatment goal (e.g., returning to work) the allied healthcare professional can then formulate sub-goals aimed at helping the patient achieve the desired outcome(s) at the levels of activities and participation. Participants emphasized the importance of involving patients in setting treatment and rehabilitation goals. This was illustrated by the following quotes:

> *"You need to consider which rehabilitation goals are relevant. Some goals are not applicable in the acute phase. Certain ones can be very useful, but I won't implement them during hospitalization, they need to be addressed in community care".* (Participant 7, occupational therapist)

Patients' *receptiveness* and *motivation* reflect their attitude toward rehabilitation and can influence their uptake of allied healthcare. When patients disregard advice or fail to recognize its importance, they may become less engaged in their recovery process. This is illustrated by the following quote:

> *"Some people don't find it [the exercises] important enough, don't see the severity of the situation and then don't do it."* (Participant 10, physical therapist)

On the other hand, when patients do not fully understand the advice given, this may increase the need for allied healthcare. Participants noted that they often intensify therapy to enhance patient understanding. If there is any doubt about a patient's comprehension or ability to return home safely, they consistently refer the patient to a community care colleague to ensure appropriate follow-up.

> *"Sometimes you cannot accurately determine if someone can continue at home, but indeed, when in doubt, you should refer them. You can't just leave them to fend for themselves."* (Participant 8, dietician)

Participants noted that patients' *coping strategies* are important to consider, as they may fluctuate during hospitalization. They recognized their role in addressing these strategies and providing information about the patient's condition as part of the treatment.

Process of identification

With regard to the process of identifying patients with allied healthcare needs, three themes were identified: 1) "Timing of identification", 2) "Uniformity in identification", and 3) "Roles and collaboration in identification".

Timing of identification - Participants found it challenging to determine the optimal timing for identifying patients' allied healthcare needs, as this varies across types of hospital admissions. For example, elective admissions usually follow a structured planning process, while acute admissions often do not. Identifying needs too early may lead to inaccurate assessments, while doing

so too late could result in inadequate transitional care or increased workload for healthcare professionals. This is illustrated by the following quote:

> *"Is the patient going home or not? That is the decision you need to make in time, and if someone is going home, then you arrange everything and check if allied healthcare after hospitalization is needed."* (Participant 2, physical therapist)

Furthermore, it became clear that two distinct moments of identification are needed, each with a different goal: 1) identification by the nurse/physician when allied healthcare professionals are needed during hospitalization, which should be done early after admission, and 2) identification by the allied healthcare professional to determine allied healthcare needs after hospitalization, which should be done close to discharge. Participants emphasized the importance of regularly identifying allied healthcare needs in patients with prolonged hospital stays, as these needs may change over time.

> *"I think that a person should be screened more often to get a more complete picture as opposed to a one-time evaluation."* (Participant 3, physical therapist)

Uniformity in identification - Participants expressed concern about the lack of protocols and awareness on the ward regarding the continuity of allied healthcare. While there are standardized methods to support continuity, everyone handles them in their own way. They therefore emphasized the importance of standardized protocols for identification of allied healthcare needs. Such standardization could ensure that all healthcare professionals have a clear understanding of the necessary actions and timing for transitional care. Allied healthcare needs should be documented at a designated location in the electronic patient record. Colleagues should assess and handle the identified indicators in the same manner, which can prevent redundant questioning of patients and professionals. This is illustrated by the following quote:

> *"How I do it [documentation of allied healthcare needs] is not a model for how others do it. Some are more structured than others. I think we should actually have a uniform policy."* (Participant 11, dietician)

Roles and collaboration in identification - Participants indicated that roles during transitional care are currently roughly defined as follows: nurses and/or physicians are tasked with assessing whether a problem necessitates the involvement of allied healthcare professionals during hospitalization and/or if it

can be adequately addressed by the nurse. For instance, motivating patients to get out of bed can be managed by the nurse, as indicated by our participants. However, if the patient does not comply with the advice of the nurse and/or experiences difficulties with getting out of bed, then the physical therapist becomes involved. When allied healthcare professionals are consulted during hospitalization, they in turn assess what their profession can contribute to a patients' recovery and decide whether their services should continue after the patient leaves the hospital. This is illustrated by the following quotes:

> *"I think that the nurses and physicians can make a good assessment as to whether we [allied healthcare professionals] are needed during hospitalization."* (Participant 11, dietician)

> *"The allied healthcare professional thereafter decides what is needed during and after hospitalization."* (Participant 8, dietician)

Participants emphasized that collaboration among healthcare professionals is crucial for identifying patients' allied healthcare needs and ensuring effective transitional care. While multidisciplinary meetings already take place in some wards to address these needs, participants identified areas for improvement, including enhancing communication between different settings and involving colleagues earlier during hospital admission. Lack of communication between colleagues is seen as a missed opportunity of identifying allied healthcare needs, which is illustrated by the following quotes:

> *"A big point of frustration for me is that sometimes patients are already gone before we are even informed of their discharge, then you can't even do a proper discharge interview."* (Participant 11, dietician)

> *"A potential risk with the current process is that if we are asked and cannot come on the same day, the patient is sometimes already discharged. Consequently, the patient goes home without our assessment, and the community care colleague is not involved in the patient's care."* (Participant 5, occupational therapist)

Identification in clinical practice

During the interviews and focus groups, participants provided us with information and sample questions they used in practice to evaluate whether patients require allied healthcare after hospitalization. These sample questions were organized according to the corresponding themes and are presented below per indicator.

Table 2: Questions to assess allied healthcare needs

Aims	Theme	Indicator	Questions for consideration in clinical practice
Indicators for allied healthcare needs	Health condition	Trajectory and complexity of the hospitalization	How complex was the patient's hospital stay in terms of body functions? Consider indicators such as the length of stay, surgical procedures, or ICU admission.
		Process of recovery	How is the patients' recovery during hospitalization?
	Body functions and structures	Pre-hospitalization functioning	What were the patients' details concerning exercise tolerance, mobility and cognition… prior to hospitalization?
		Current functioning	What are the patients' details concerning exercise tolerance, mobility and cognition…?
		Relation to pre-hospitalization and current functioning	Has there been a change in the patients' status from before hospitalization to now?
	Activities	Activities of daily living	Is the patient capable of performing activities of daily living, or able to regain the ability to perform these activities?
		Self-care	Is the patient capable of independently performing self-care activities, or do they require assistance to do so?
	External factors	Caregiver network	Are there any informal caregivers, and if so, how many hours per week do they assist?
		Social support network	Does the patient live alone or with a partner, and how is their social network?
		Home environment	How is the home environment configured, particularly regarding stairs and the location of the bathroom and bedroom?
		Financial status	What is the patients' financial status, and is there insurance coverage for allied healthcare following hospitalization?
	Personal factors	Specific request for help	Does the patient have a specific request for allied healthcare?
		Presence of rehabilitation goals	Does the patient have a specific goal that is expected to be unattainable without assistance from allied healthcare professionals?
		Receptiveness	How receptive is the patient to instructions from allied healthcare professionals?
		Motivation	Does the patient possess intrinsic motivation for allied healthcare?
		Insight in health condition	Does the patient have insight into their health condition and understand the impact of this hospitalization?
		Coping strategies	Does the patient recognize the importance of allied healthcare for their own recovery?

Aims	Theme	Indicator	Questions for consideration in clinical practice
Process of identification	Timing of identification	Is support from an allied healthcare professional needed or can a nurse/physician support the patient?	
		Which allied healthcare professionals should be consulted during hospitalization?	
		Which allied healthcare professionals are needed after hospitalization?	
		Has there been a change in the patient's status during hospitalization, indicating that repeated screening may be necessary?	
	Uniformity in identification	To which allied healthcare network should a patient be referred for continuity of allied healthcare?	
		What should be reported in the discharge letter for the community care colleague?	
	Roles and collaboration in identification	Who is responsible for what regarding continuity of allied healthcare?	
		How and what should the community care colleague respond to the discharge letter?	

DISCUSSION

Summary of key findings

This study inductively identified a broad set of indicators that can support the identification of patients in need of allied healthcare following hospitalization. Examples of such indicators are *process of recovery, caregiver network* and *coping strategies.* These indicators could then be mapped onto the "Health condition", "Body functions and structures", "Activities", "External factors", and "Personal factors" components of the ICF, but not onto the "Participation" component. With regard to the process of identifying patients with allied healthcare needs, three themes were identified that warranted specific attention: "Timing of identification", "Uniformity in identification", and "Roles and collaboration in identification". To facilitate the practical use of these findings, sample questions were developed to help guide healthcare professionals in collecting relevant information during clinical encounters.

A notable finding was that, alongside the usual criteria related to functioning (i.e. muscle strength, endurance), patients' *motivation to continue allied healthcare* and the *presence of rehabilitation goals* were consistently emphasized as important indicators that are often missed in existing screening tools. While some tools (e.g., comprehensive geriatric assessment and InterRAI) (14, 21, 22)

do include indicators, such as patients' attitudes and the presence of goals, these tools tend to be time-consuming and broad, making them less practical for use among all patients admitted to relevant wards. It is also noteworthy that no indicators were identified within the "Participation" component of the ICF. While this may in part be due to the hospital-based focus of the participants—who are primarily involved in the acute phase of recovery—it may also reflect a gap in how participation is currently considered. The absence of indicators in this domain suggests that opportunities to anticipate long-term functional outcomes may be overlooked. This may suggest that incorporating participation-related considerations earlier in the care trajectory, while acknowledging that doing so may require broader interdisciplinary collaboration and continuity across care settings.

As for the process of identification, an interesting finding of our study was the timing of assessing allied healthcare needs, because this should be conducted at two moments and should be repeated over time. Additionally, our findings reflect the importance of collaboration between healthcare professionals in screening patients for allied healthcare needs. This aligns with findings from previous studies investigating transitional care, (5, 23, 24) specifically a study that investigated transitional care experiences from the patient's perspective and found that healthcare professionals are often 'on their own island' (24). Our results also showed that roles of healthcare professionals in identifying patients should be clear and may vary by setting and country. This is in line with previous research identifying effective components of transitional care that found that clear roles in identifying healthcare needs during the hospital-to-home transition are essential (23, 25). Therefore, it is recommended to not only specify when a patient should be screened for allied healthcare needs after hospitalization, but also to describe who is in charge at a specific moment.

Strenghts

This study has several strengths. Several quality criteria were incorporated into the study design to ensure trustworthiness and reliability (26). Credibility was enhanced by conducting a pilot interview and member checks. Recording, transcribing and reaching inter-coder agreement contributes to the trustworthiness of this study. To enhance the transferability of the data, the research group was engaged in the entire study process and outcomes were repeatedly discussed. In this study, an inductive approach to data analysis was used, allowing the research findings to emerge directly from the data. This approach ensured that the researchers maintained an open perspective during analysis. The decision to use the ICF for mapping the results was ultimately

based on the outcomes of the inductive analysis and driven by the fact that professionals utilize this model for establishing rehabilitation goals.

Limitations

There were also some limitations. First, we included only allied healthcare professionals from the AUMC. Although the sample was diverse in professional roles, the findings may not generalize to non-academic hospitals. Second, only hospital-based professionals were included. Community care professionals might have offered broader insights into the consequences of screening patients who continue allied healthcare after discharge. We therefore recommend presenting the indicators to community care colleagues to verify the accuracy and completeness of our findings. Third, the perspectives of patients and informal caregivers were not included in this study. Their input may provide valuable insights to ensure that all relevant indicators are appropriately represented in this overview. Incorporating their perspectives would be a worthwhile step before implementing this overview in routine practice. Fourth, not all ward types were included, we aimed to develop broadly applicable indicators that can support the identification of allied healthcare needs across a wide range of hospitalized patients, regardless of diagnosis. This likely captured the most common allied healthcare needs, limiting the impact on validity. Fifth, the fact that researcher (IB) was already familiar with the participants might have affected the results. However, it may have led to more in-depth interviews and focus groups, as the participants felt comfortable to speak freely.

CONCLUSIONS

This study aimed to identify key indicators that hospital-based allied healthcare professionals can use to determine patients' allied healthcare needs after hospitalization. The results show that there are many different indicators involved, which can be categorized within the ICF. The indicators can assist healthcare professionals in making more structured and accurate decisions when identifying allied healthcare needs in hospitalized patients. Future research should aim to synthesize these indicators into a screening tool that can be utilized in clinical practice. In addition, attention should be given to integrating patient motivation and rehabilitation goals as potential novel indicators. To support implementation in clinical practice, the screening tool should be concise, feasible for use, and aligned with multidisciplinary

workflows to ensure timely identification of patients' allied healthcare needs after discharge.

Data availability: The data that support the findings of this study are available on request from the corresponding author.

Informed consent: All participants provided written informed consent.

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APPENDICES





Chapter 7

Development of the transmural allied healthcare pathway (TULIP) – An intervention mapping approach

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ABSTRACT

Background

Hospital-to-home transitions for patients with complex allied healthcare needs are often fragmented, with limited structured, theory-informed approaches to support multidisciplinary collaboration. While Intervention Mapping (IM) has been applied in health intervention development, few studies address complex, transmural care pathways. This study describes the systematic development of a transmural allied healthcare pathway to optimize hospital-to-home transitions, using IM.

Methods

A development study was conducted following the first four steps of IM. Stakeholders from the Amsterdam University Medical Centers and allied healthcare professionals from primary care in the Amsterdam region were involved throughout the process. The first four steps of IM were followed 1) a needs assessment was conducted, 2) the logic model of the problem was translated into the logic model of change, 3) theory-based intervention methods were selected, and 4) the intervention program was developed.

Results

The needs assessment identified key issues affecting transitional care such as unclear role division, delayed identification of patients requiring allied healthcare, fragmented communication across settings, and insufficiently tailored patient and family involvement. These findings informed a logic model of the problem, corresponding performance objectives, and the logic model of change. The resulting intervention, TULIP, aims to strengthen collaboration and communication across hospital and primary care. TULIP consists of six components: early patient identification, appointment of a coordinator, family involvement, improved discharge summaries, referral within allied healthcare networks, and structured post-discharge follow-up.

Conclusions

This study shows how a structured, theory-informed approach can be used to develop a transmural allied healthcare intervention for hospital-to-home transitions. The resulting TULIP blueprint provides healthcare professionals with concrete, adaptable components that can strengthen collaboration, improve information exchange, and support consistent allied healthcare involvement across settings. TULIP offers a practical intervention that

organizations can tailor to their local workflows. Future studies should assess its feasibility, (cost-)effectiveness, and sustainability in routine practice.

BACKGROUND

Patients with complex healthcare needs often experience fragmented care, characterized by an uncoordinated delivery of healthcare services across multiple providers, particularly during hospital-to-home transitions. This might result in poorer health-related outcomes and avoidable readmissions (1, 2). These patients typically suffer from multiple chronic conditions, mental health problems, drug interactions, and social vulnerability, all of which hinder care coordination and continuity (3). For example, hospital-to-home transitions are often hampered by an overload of information that does not stick, insufficient family involvement, and difficulties navigating the healthcare system (4, 5).

A multidisciplinary, patient-centered approach, including services such as physiotherapy, occupational therapy, dietetics, and speech therapy, together with the support of a case manager overseeing the transition process has been shown to improve care coordination, reduce readmissions, and enhance patient outcomes (6, 7). However, allied healthcare professionals require clear role definitions and task division to deliver high-quality care during these transitions (4, 8). Furthermore, there is a need for more effective multidisciplinary communication, which could be facilitated by innovative information technologies (e.g., a shared digital communication platform) to ensure optimal coordination and care continuity (9).

To address the aforementioned challenges, developing and implementing integrated, patient-centered, multidisciplinary transitional care interventions has become a priority for many healthcare settings (7, 10). Multidisciplinary transitional care interventions generally include components such as early identification of patients' care needs, improved communication between hospital and primary care professionals, and tailored support to help patients and families (11, 12). Evidence from recent systematic reviews highlights the potential of these interventions for improving health-related outcomes, reducing readmissions and mortality, and being cost-effective (13). However, designing and implementing multidisciplinary transitional care interventions is complex, because they must address the needs of multiple stakeholders across different settings simultaneously. Hence, systematic planning is essential to maximize the chances of their successful and sustainable implementation.

The Intervention Mapping framework (IM) is a widely used systematic approach to design, implement, and evaluate healthcare interventions (14-17). Although IM has been applied in various settings, few studies illustrate its use for complex, multidisciplinary transitional care interventions involving both hospital and primary care allied healthcare professionals. Existing literature

rarely addresses the development of structured transmural pathways, the integration of multiple allied healthcare disciplines, or the systematic involvement of diverse stakeholders in intervention design. This paper presents the development of the transmural allied healthcare pathway (TULIP) using IM, demonstrating a novel methodological application that addresses these gaps. The IM approach we used to develop TULIP will provide clinicians and researchers globally with a practical guide to facilitate the successful and sustainable development and implementation of similar interventions in their own settings.

MATERIALS AND METHODS

Design

The IM approach is structured into six iterative steps: (1) Needs assessment, which involves identifying the problem, its determinants, and stakeholders' needs; (2) Program objectives, defining measurable outcomes based on the needs assessment; (3) Theory-based methods and strategies, involving the selection of methods and theories to design intervention components; (4) Program development, including necessary materials, activities, and delivery methods; (5) Implementation plan, selecting strategies to ensure effective delivery and adoption of the intervention; and (6) Evaluation plan, which includes process and outcome evaluations to assess and refine the intervention (16, 17). This paper focuses on the first four steps of IM, as they are essential for establishing an intervention (Table 1). The implementation and evaluation of TULIP will be presented in a separate publication.

Table 1: Intervention Mapping steps and actions

	Action
1. Logic model of the problem	1) creating planning groups; 2) conducting a needs assessment, 3) describing the local context, 4) stating program goals
2. Logic model of change	1) stating expected behavioral- and environmental outcomes, 2) specifying performance objectives, 3) selecting personal determinants, 4) specifying change objectives, 5) combining this in one overview (logic model of change)
3. Program design	1) generate program themes, 2) choose theory- and evidence-based change methods, 3) design practical applications
4. Program production	1) refine program structure, 2) prepare plans for materials/protocols, 3) draft messages, materials and protocols, 4) pretest and produce materials
5. Program implementation plan	1) identify program implementers, 2) state outcomes and objectives, 3) construct matrices of change, 4) design implementation interventions
6. Evaluation Plan	1) write effect and process evaluation, develop indicators for assessment, 3) specify evaluation design, 4) complete evaluation plan

Setting

TULIP was developed for two wards of the Amsterdam University Medical Centers (AUMC), Internal medicine and Trauma surgery and primary care settings in the Amsterdam region. The AUMC Medical Ethics Review Committee granted a waiver (2024.0512). The research complied with the Declaration of Helsinki and did not involve the collection of identifiable personal data; therefore, informed consent was not required.

Timespan

This four-year TULIP project started in January 2023 with an extensive needs assessment. The intervention development took place between January 2024 and January 2025 and will be followed by its implementation and evaluation from February 2025 to December 2026.

Reporting standards

Reporting of the intervention development followed the GUIDED (Guidance for Reporting Intervention Development Studies in Health Research) checklist to enhance transparency, reproducibility, and alignment with implementation science standards. The final intervention is described in detail according to the TIDieR (Template for Intervention Description and Replication) checklist.

Step 1: Logic model of the problem

A needs assessment was conducted using qualitative and quantitative methods (Figure 1). First, focus groups and interviews were conducted to explore the experiences, perceptions, and needs of patients and professionals regarding hospital-to-home transitions (4, 18, 19). Second, we conducted four systematic reviews examining stakeholders' experiences, the (cost-)effectiveness of multidisciplinary transitional care interventions, and the barriers and facilitators to their successful implementation (11-13, 20).

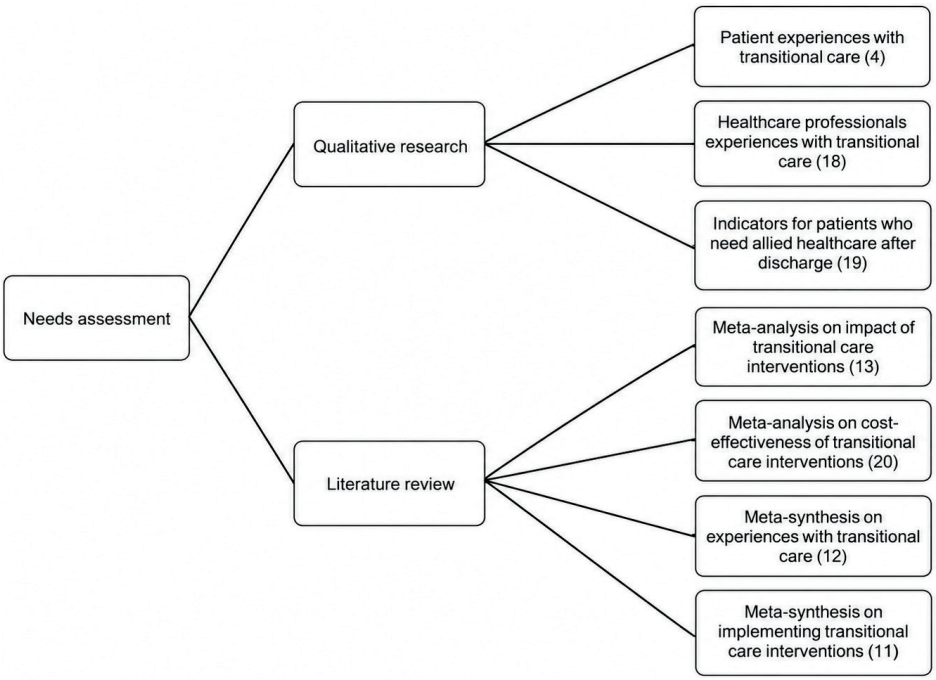


Figure 1: Needs assessment overview

Using the PRECEDE-PROCEED model (21), findings were translated into a logic model of the problem that summarized the main issues that allied healthcare professionals are facing. Our stakeholder group included researchers, allied healthcare professionals from hospital and primary care, nurses, medical doctors, managers, ICT staff, patients and their families. We focused primarily on allied health professionals in hospital and primary care, as they were expected to undergo the most substantial behavioral changes within TULIP. We also gathered insights into the local context and existing programs relevant to TULIP, which informed the formulation of the program goals.

Step 2: Logic model of change

This step provides the foundation for TULIP by clearly describing the changes it aims to achieve. The matrices describe how modifying determinants such as improving knowledge of each other's roles or increasing confidence in cross-setting communication, could strengthen collaboration and ultimately improve patient transitions. Because such determinants may differ across settings, the matrices were tailored healthcare professionals involved in this project but structured to support adaptation in other contexts (22).

Step 3: Program design

Program themes emerging from the needs assessment such as early identification, coordinated communication, and family involvement, guided the prioritization of determinants. Theoretical change methods were selected from the IM framework (17) and translated into practical applications. Practical applications were designed to be feasible by taking into account the characteristics of the healthcare professionals in both the hospital and primary care setting, as well as insights from successful strategies identified during the needs assessment (11).

Step 4: Program production

In this step, TULIP was developed based on the results from steps 1–3. For this purpose, the results of step 1-3 were first discussed and checked within the research team to ensure that everything was properly integrated. Then, to address the diverse needs of allied healthcare professionals, TULIP was divided into six components. To ensure a tailored approach, each component was assessed for its applicability to the respective wards through discussions with healthcare professionals. Their feedback was discussed within meetings with the research team and refined the components.

RESULTS

Step 1: Logic model of the problem

A detailed description of the needs assessment results from our qualitative studies and literature reviews is provided elsewhere (4, 11, 12, 18-20). In summary, patients emphasized the importance of being actively involved in transitional care decisions. Discharge was often experienced as sudden, leaving patients feeling emotionally and physically unprepared. Families were

seen as essential partners who understood the home environment and could assist in arranging follow-up care (4, 12).

Patients also reported difficulties in recalling and processing information provided close to discharge. The amount of information was overwhelming and often delivered at a moment when attention was focused on going home; understanding was not consistently checked. Despite these challenges, patients felt well supported by allied healthcare professionals during admission, valuing the continuity created by collaboration among these professionals (4, 12).

Healthcare professionals highlighted the need for clear role definitions and coordinated task division, timely discharge planning, and structured referrals within specialized allied healthcare networks (12, 18, 19). Both patients and professionals noted gaps in collaboration and information exchange between hospital and primary care settings. Patients described one-way communication, while professionals emphasized the need for uniform, structured information transfer embedded in routine workflows (12, 18, 19).

Findings from our systematic reviews further indicated that multidisciplinary transitional care interventions have the potential to reduce readmissions and mortality, improve quality of life and physical functioning, and reduce healthcare and societal costs (11-13, 20). Together, these insights informed the development of the logic model of the problem (Figure 2).

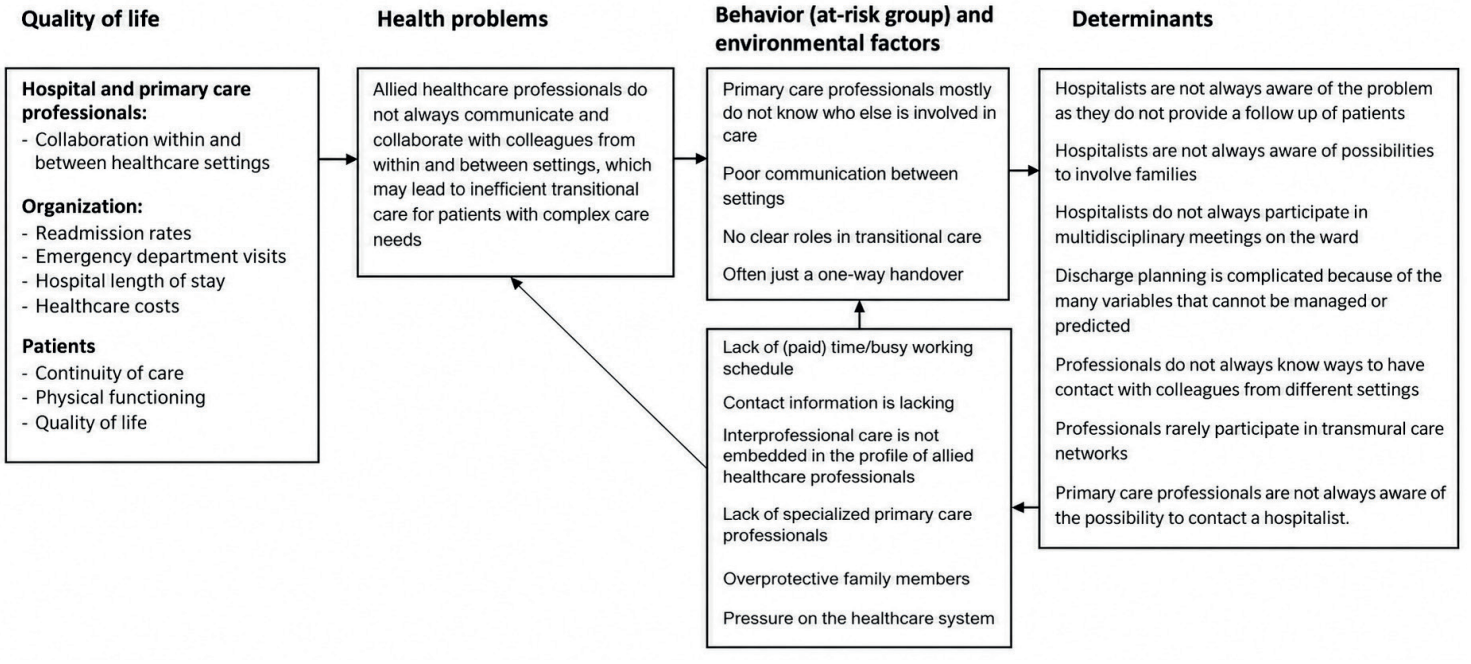


Figure 2: Logic model of the problem

The needs assessment also provided us with information about related initiatives within the AUMC, other hospitals, and the primary care setting. Examples include a project optimizing the hospital-to-home transition from a nursing perspective and one promoting nutrition and physical activity during hospitalization with weekly allied healthcare meetings. Through discussions with the leaders of these initiatives, we facilitated mutual learning and collaboration. Where possible, TULIP was integrated with these initiatives to ensure efficiency. Based on the needs assessment, program goals were defined at the patient, professional, and organizational levels, including improving patient functioning, strengthening collaboration, and reducing avoidable hospital utilization.

Step 2: Logic model of change

Based on the information gathered in step 1, the logic model of the problem was transformed into a logic model of change (see Appendix A) specifying the desired behavioral outcomes and the determinants that need to be addressed to achieve them (17). The result of TULIP is optimized collaboration and communication between healthcare professionals from different settings, which in turn supports transitional care for patients with allied healthcare needs. For hospital-based allied healthcare professionals, performance objectives included coordinated discharge planning, effective handovers to primary care, and involvement of families when appropriate. These performance objectives were linked to key determinants such as knowledge of available services, confidence in interprofessional communication, skills to use standardized tools, and positive expectations regarding collaborative transitional care.

Table 2 presents the matrices of performance objectives and determinants for hospital-based allied healthcare professionals. Similar matrices were developed for primary care professionals and for patients and families (Appendices B and C). Together, these matrices outline the specific behavioral changes required to address the problems identified in Step 1.

Table 2: Performance objectives, determinants and change objectives for hospital allied healthcare professionals

Behavioral/environmental outcomes: Hospital allied healthcare professionals taking their role in transitional care				
	Personal determinants			
Performance Objectives	**Knowledge**	**Skills and Self-efficacy**	**Attitude**	**Outcome expectations**
PO1. Hospital professionals identify patients with allied healthcare needs after hospitalization	K1. Define signs of patients who may require allied healthcare after hospitalization	SS1. Demonstrate ability to use a flowchart tool to identify patients with allied healthcare needs after hospitalization	A1. Recognize the value of identifying patients with allied healthcare needs after discharge	O1. Expect that identifying patients will result in enrolling patients in a transmural allied healthcare pathway
PO2. Hospital professionals participate in multidisciplinary meetings on the ward to discuss allied healthcare needs after hospitalization	K2. State the roles and responsibilities of different healthcare professionals on the ward in the discharge process	SS2. Express confidence in participating in a multidisciplinary meeting on the ward	A2. Recognize the value of multi-disciplinary coordination and collaboration	O2. Expect that active participation of hospital professionals in multi-disciplinary meetings focused on discharge planning contributes to optimized transitional care
PO3. Hospital professionals involve patients and their families in transitional care	K3. List strategies on how to involve patients and families in transitional care	SS3. Demonstrate empathy and active listening skills to address patient and family preferences	A3. Express positive feelings about the effectiveness of collaborative partnerships between healthcare professionals, patients, and families	O3. Expect that the intervention can foster a culture of patient and family-centered care during transitions, leading to improved transitional care
PO4. Hospital professionals conduct a uniform, complete discharge letter, and interact with their primary care colleague	K4. List the components that should be included in a discharge letter to ensure a comprehensive information transfer	SS4. Showing proficiency in using electronic communication systems and formats for online transmission of discharge letters	A4. Feel positive about the efficacy of online communication methods for transmitting discharge letters securely and efficiently	O4. Expect that consistency and completeness of discharge letters leads to better information transfer and coordination of care between settings

Behavioral/environmental outcomes: Hospital allied healthcare professionals taking their role in transitional care				
		Personal determinants		
Performance Objectives	**Knowledge**	**Skills and Self-efficacy**	**Attitude**	**Outcome expectations**
PO5. Hospital professionals refer their patients within specialized allied healthcare networks	K5. List the available specialized allied healthcare services and networks in the Amsterdam region	SS5. Demonstrate the ability to navigate the referral process and facilitate seamless transitions of care for patients	-	O5. Expect that referral of patients to specialized allied healthcare networks leads to more comprehensive and coordinated care
PO6. Hospital professionals monitor their patients after hospitalization	K6. Recognize their role in monitoring patients after hospitalization	SS6. Showing proficiency in conducting (telephone) follow-up for patients after hospitalization	-	O6. Expect that monitoring patients can improve patient and healthcare professionals' satisfaction of transitional care

Step 3: Program design

In the third step, we decided 'how' to achieve the objectives identified in step two by selecting theoretical change methods provided by IM and translating them into practical applications to influence the behavior and the environment (17). Three determinants emerged as most important and modifiable: knowledge, skills and self-efficacy, and attitudes and outcome expectations (4, 12, 13, 18). To strengthen knowledge, we developed practical tools such as checklists, ward posters, a standardized handover template, newsletters, and an online platform with infographics (23, 24).

To improve skills and self-efficacy, we incorporated clinical instruction sessions and structured feedback moments in which professionals could practice tasks, ask questions, and reflect on their experiences with TULIP (25).

To influence attitudes and outcome expectations, we identified local champions who acted as role models and supported colleagues during the early stages of implementation (26).

Step 4: Program production

In step 4, TULIP was developed and consisted of six components: 1) Identification of patients who need allied healthcare services, 2) Appointing a coordinator, 3)

Family involvement, 4) Improved discharge summary, 5) Referring within allied healthcare networks and 6) Structured (telephone) follow-up (Figure 3). Each component is supported by a delivery channel through which TULIP is delivered (e.g. digital communication platform, or conversation). All components were linked to the results of our needs assessment, per discharge phase (hospitalization, bridging and post-discharge) (11, 12). Components were refined in iterative sessions with allied healthcare professionals from both hospital and primary care. Their feedback led to the outline of the digital communication platform, clearer terminology, and a structured approach to connect with colleagues from different settings. The blueprint with detailed information about TULIP can be found in Appendix D.

We also identified several barriers including: including limited time, staff turnover, budget constraints, primary care waiting lists, and hospital bed pressure. We addressed these challenges by integrating TULIP into existing workflows, setting clear selection criteria, and designing the intervention so it could be delivered without additional personnel. Anticipated reductions in readmissions may contribute to its long-term sustainability.

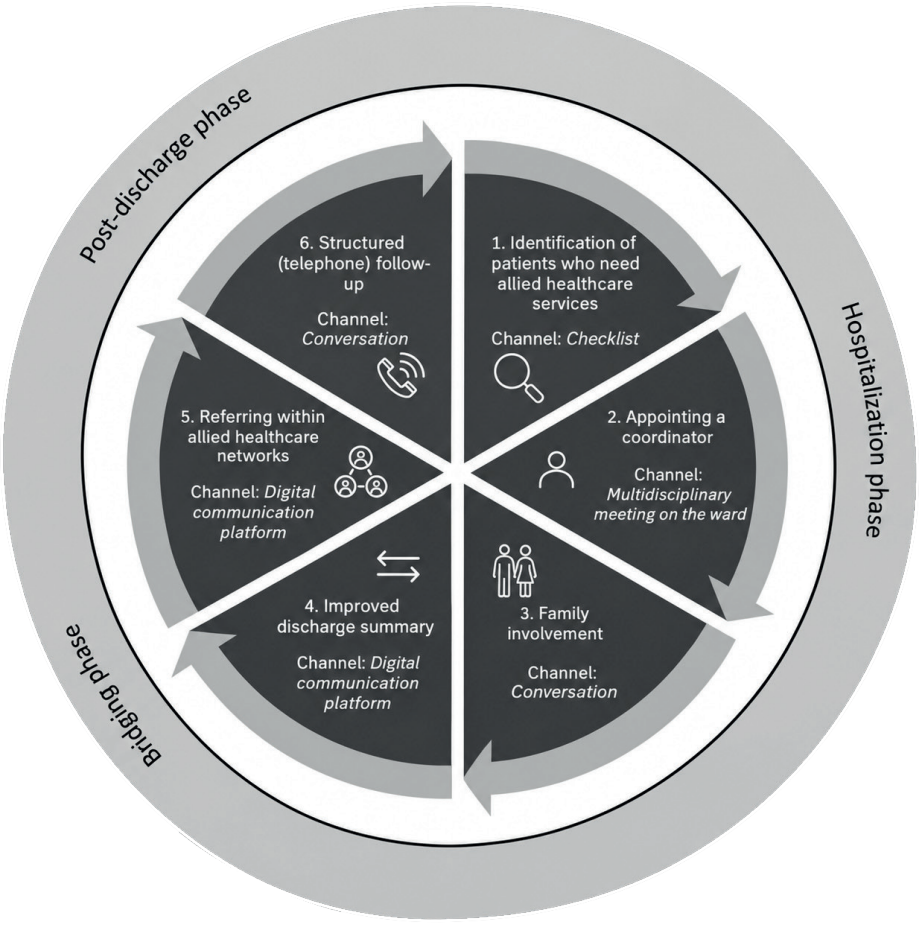


Figure 3: Overview of TULIP

Hospitalization phase: When the patient is admitted to the hospital.
Bridging phase: From discharge planning to patient preparation for discharge.
Post-discharge phase: After discharge, at home or in a (geriatric) rehabilitation center.

DISCUSSION

This paper describes the development of a hospital-to-home transmural allied healthcare intervention to facilitate collaboration between healthcare professionals and improve continuity of allied healthcare after hospitalization. Based on literature, empirical research, behavior change theories following IM and multiple discussions, TULIP was developed. The intervention includes six components, 1) Identification of patients who need allied healthcare services,

2) Appointing a coordinator, 3) Family involvement, 4) Improved discharge summary, 5) Referring within allied healthcare networks and 6) Structured (telephone) follow-up.

Our study contributes to the growing body of literature on transitional care interventions. Previous research has demonstrated that structured transitional care, often involving coordination, systematic discharge planning, and follow-up, can reduce readmissions, enhance patient functioning, and lower healthcare costs (13, 27). Many of these interventions were developed for specific patient groups, such as oncology or neurology, and often focused on medical or nursing transitions rather than on allied healthcare (28-30). In contrast, TULIP addresses the entire transitional care process from an allied healthcare perspective and was designed for a broader patient population, irrespective of diagnosis or medical specialty. By focusing specifically on allied healthcare professionals across both hospital and primary care settings, this study highlights the role of allied healthcare professionals, an area that has received less empirical attention even though it is crucial for supporting patient functioning during hospital-to-home transitions.

Our results could serve as a blueprint for clinicians and researchers to facilitate the implementation of similar interventions in their own settings. Professionals should then assess whether the findings from our needs assessment align with their specific context. We do not recommend conducting an entirely new needs assessment, as there is extensive literature available, and the process is time-intensive (4, 11-13, 27). Instead, one could evaluate each component of TULIP to determine its adaptability to their own setting. For instance, if a digital communication platform is not available, one might consider delivering its content through alternative delivery channels. We encourage professionals to critically evaluate ongoing projects in their own setting and align them with the steps presented in this research.

This study has several strengths and limitations. One strength is the comprehensive needs assessment, which took about two years to complete and involved all relevant stakeholders. Additionally, the intervention was developed using the iterative steps of IM, which will enhance its (cost-)effectiveness because of its theory- and evidence-based approach. The developed TULIP intervention included six components, which implies a moderate complex intervention, that facilitates its implementation as well (27). However, a limitation is the generalizability of our results to patient groups for whom healthcare pathways are not yet available. As a consequence, each component of the intervention should be carefully evaluated by researchers and clinicians

within a specific population to determine its applicability, and adjusted if needed (31, 32). Additionally, at this moment our study focuses on hospital-to-home transitions involving allied healthcare professionals, without integrating medication or nursing handovers into the intervention. Further research is needed to establish how these aspects could also be integrated. Another limitation is the presence of barriers associated with the implementation of the intervention that are beyond our control. Examples of such factors are that the study covers most of the costs, staff turnover, and waiting lists in primary care are challenges we cannot directly address. These issues may affect the intervention's success.

Future research should focus on assessing the impact of TULIP. For that, further efforts are required to complete steps 5 and 6 of the IM process. Step 5 involves the selection of implementation strategies, which will be supported by the Expert Recommendations of Implementing Change (e.g. appointing champions, develop educational materials) (31). In step 6, an evaluation plan will be developed, guided by the Reach, Effectiveness, Adoption, Implementation, and Maintenance framework, with evaluation outcomes aligned with the project goals (32). Once the impact is proven, integrating TULIP with the transfer of medical information could be a valuable next step.

CONCLUSIONS

In summary, we developed a theory-informed, transmural allied healthcare pathway using IM to strengthen multidisciplinary collaboration and improve hospital-to-home transitions for patients with allied healthcare needs. This study illustrates how IM can be applied within a complex, multi-setting context and delivers a practical, replicable blueprint that organizations can adapt to enhance service coordination. Future research should evaluate the feasibility, effectiveness, and long-term sustainability of this pathway across diverse healthcare settings.

Data availability statement: As this study primarily reports the development of an intervention using the Intervention Mapping framework, no individual participant data were collected. Additional materials, including the logic models, matrices of change objectives, and TIDieR checklist, are available in the Appendices.

Informed consent: This study did not involve the recruitment of human participants. As such, the requirement for obtaining informed consent was not applicable.

Acknowledgements: No acknowledgments to declare.

Ethics approval statement: The AUMC Medical Ethics Review Committee granted a waiver (2024.0512). The research complied with the Declaration of Helsinki.

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APPENDICES





Chapter 8

Facilitators, barriers, and guidance to successful implementation of multidisciplinary transitional care interventions: A qualitative systematic review using the consolidated framework for implementation research

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*J.W.M. van Grootel and R.J. Collet made equal contributions to this manuscript and shared first authorship

ABSTRACT

Background

Multidisciplinary transitional care interventions aim to improve the coordination and continuity of healthcare during hospitalization and after discharge for patients with complex care needs related to physical, nutritional, or psychosocial status. Implementing such interventions is complex as they involve many stakeholders across multiple settings. Numerous studies have evaluated patients', family members', and healthcare professionals' experiences with multidisciplinary transitional care interventions, which can provide insight into facilitators and barriers to their implementation.

Objective

To provide an overview of facilitators and barriers to implementing multidisciplinary transitional care interventions, which could be considered before developing implementation strategies.

Design

A qualitative systematic review using the Consolidated Framework for Implementation Research.

Settings

Hospitals and primary care.

Participants

Adult patients admitted to a hospital, regardless of their diagnosis, as well as their family members and hospital and primary care healthcare professionals.

Methods

Embase, CINAHL, and Medline were searched for qualitative studies evaluating multidisciplinary transitional care interventions through patients', family members', and healthcare professionals' experiences and views from inception until June 2024. The methodological rigor was assessed with the Critical Appraisal Skills Program. We identified facilitators and barriers to the successful implementation of multidisciplinary transitional care interventions with the Consolidated Framework for Implementation Research. Facilitators and barriers were categorized into pre- or post-discharge or general factors.

Results

Twelve studies were included and appraised. We identified 79 factors, mostly linked to three domains of the Consolidated Framework for Implementation Research: Innovation, Inner setting, and Individuals involved. Facilitators included "comprehensive follow-up care needs assessment"(pre-discharge), "immediate, tailored follow-up care"(post-discharge), and "improved communication between stakeholders"(general). Barriers included "shortage of hospital beds" and "lack of time"(pre-discharge), "lack of available primary care professionals"(post-discharge), "inconsistencies of stakeholders' schedules" and "intervention costs"(general).

Conclusions

The factors identified could serve as a non-exhaustive inventory list to inspire readers who wish to implement a multidisciplinary transitional care intervention in their settings. Digital tools and alternative financing models might overcome cost and reimbursement issues, the increasing complexity of patient care, and shortcomings, such as the lack of available hospital beds or professionals. Further research should identify effective implementation strategies, considering the pre-, post-discharge, and general factors identified.

INTRODUCTION

The aging population and the increasing number of patients with multimorbidity have increased the complexity of care delivery during hospital-to-home transitions. As of 2023, the global prevalence of multimorbidity has been estimated to be 37.2%, with evidence indicating a strong association between aging and multimorbidity (1, 2). Delivering care to older adults or individuals with multimorbidity is particularly challenging, as they often have more complex care needs related to their physical, nutritional, cognitive, and/or psychosocial status due to interactions between many factors in their socio-ecological environment and inherited biology (e.g., lack of social support, genetic predispositions, psychological or emotional dysregulation, inappropriate utilization of healthcare services) (3). In fact, both individuals aged 65 and older and those with multimorbidity have been shown to have a higher risk of hospital readmission (4, 5).

Multidisciplinary transitional care interventions aim to improve the coordination and continuity of healthcare for patients transitioning from hospital to home by addressing patients' complex care needs, that is, a combination of medical, nursing, and allied healthcare needs — such as physiotherapy, occupational therapy, and speech and language therapy (6). These interventions generally involve hospital and primary care professionals collaborating to provide tailored care (7). Several studies have shown their effectiveness in reducing hospital readmissions and emergency department visits and improving health-related outcomes (8-10). Given the promising benefits of multidisciplinary transitional care interventions in enhancing patient care delivery and health-related outcomes, many hospitals may wish to implement them. However, implementing such interventions is challenging, because they involve many stakeholders across multiple settings.

Several qualitative studies have explored user experiences with multidisciplinary transitional care interventions (11-13); however, no comprehensive synthesis of the factors that facilitate or hinder the implementation of these interventions exists. While these individual qualitative studies offer insight into a limited number of factors contributing to the (non-)success of multidisciplinary transitional care interventions, a systematic synthesis of all available qualitative data can provide a thorough understanding of all potential systemic, organizational, and individual factors. The Consolidated Framework for Implementation Research is widely used to identify facilitators and barriers to successfully implementing healthcare interventions (14). For example, a recent qualitative study using this framework identified multiple key barriers and

facilitators to implementing a multidisciplinary transitional care intervention through interviews with older adults, family caregivers, and stakeholders from healthcare support services (15). Factors such as tailoring interventions to patient needs, patient engagement, and provider training were highlighted using the Consolidated Framework for Implementation Research.

Similarly, a comprehensive overview of all potential facilitators and barriers to implementing multidisciplinary transitional care interventions can be obtained by synthesizing and mapping data from all existing qualitative studies on the experiences of patients, family members, and healthcare professionals with these interventions. Therefore, this systematic review aimed to provide such an overview, offering valuable insights to guide researchers and clinicians in developing effective implementation strategies to enhance the success of multidisciplinary transitional care interventions in their settings.

METHODS

The protocol of this review was registered in PROSPERO (CRD42023421423). We conducted a secondary analysis of studies previously included in a larger qualitative meta-synthesis, which comprised 53 qualitative articles investigating patients', family members', and healthcare professionals' experiences and needs regarding hospital-to-home transitions (16). The larger meta-synthesis included qualitative studies on experiences around the hospital-to-home transition in general, which might also include experiences with transitional care interventions. Quantitative studies (i.e., surveys) were excluded as qualitative studies provide more in-depth information. The studies we analyzed in the current paper focused exclusively on the experiences of patients, family members, or healthcare professionals with multidisciplinary transitional care interventions, as this could provide insight into facilitators and barriers associated with their implementation.

Study selection

Briefly, the previously published meta-synthesis (16) identified studies through electronic searches in Medline, Embase, and Cinahl from inception until June 2024 that: 1) applied qualitative data collection methods (semi-structured interviews or focus groups), 2) included adult patients regardless of their diagnoses, family members, or healthcare professionals, 3) focused on experiences of hospital-to-home transitions. Studies investigating transitional care interventions that involved only one healthcare discipline (e.g., telephone

follow-up by a nurse practitioner) were excluded, as were studies reporting on patients with a mental illness only or those requiring palliative care. For the present review, papers that did not focus on evaluating a multidisciplinary transitional care intervention but on "usual care" hospital-to-home transitions were also excluded.

Quality assessment of the included studies

Each article was independently assessed by two researchers (JvG and RC) using the Critical Appraisal Skills Programme checklist for qualitative research (CASP) (17), following recommendations of Butler et al. (18) (Supplementary material, Appendix 3). Articles without a statement on ethics (item nr. 7=0.0), and those with a sum score < 6.0 were excluded (18). Lastly, the papers were categorized into high-quality (score=9.0–10.0), moderate-quality (score=7.5–9.0), and fair-quality (score=6.0-7.5). For full details on the study's search strategy, study selection procedure, quality assessment, and data extraction, we refer to the previous publication (16).

Theoretical framework

The Updated Consolidated Framework for Implementation Research is a widely used framework for identifying facilitators and barriers for the successful implementation of healthcare interventions (14). It comprises 39 subdomains associated with practical implementation organized into five domains: *Innovation* (i.e., the intervention being implemented), *Inner Setting* (i.e., the setting in which the intervention is implemented), *Outer Setting* (i.e., the setting in which the inner setting exists such as the healthcare system), *Individuals* (i.e., roles and characteristics of the stakeholders), and *Implementation Process* (i.e., activities and strategies used to implement the intervention). Applying this framework allows us to compare studies conducted in different settings and synthesize factors influencing intervention implementation. It also helps us understand which subdomains promote or inhibit health intervention adoption, implementation, and maintenance (19).

Data synthesis and analysis

We used the Updated Consolidated Framework for Implementation Research to guide the analysis and synthesis of facilitators and barriers for implementation reported in the studies. JvG and RC thoroughly read all the papers included. All studies were imported into MAXQDA 2022 (VERBI Software, 2021). JvG and RC independently coded all qualitative studies using a combination of inductive and deductive approaches. First, open codes were inductively generated by

examining first-order constructs (participants' direct quotes) and second-order constructs (study authors' interpretations) relevant to the aim of the current review. JvG and RC compared these codes to ensure consistency. Once the final list of codes was constructed, the two coders deductively linked each code to a subdomain of the Consolidated Framework for Implementation Research framework (20). JvG and RC met regularly throughout the analysis to compare their results. Any disagreement was discussed until consensus was reached. The analysis results were discussed during reflexivity meetings involving the entire research team. Facilitators and barriers were identified and summarized by the five domains of the Consolidated Framework for Implementation Research. Then, all factors were organized into three categories:

1. General factors, i.e. factors relevant to the entire hospital-to-home transition,
2. Pre-discharge factors, i.e. factors relevant only to the hospital phase,
3. Post-discharge factors, i.e. factors relevant only to the home phase.

Finally, results were narratively described and summarized using Tables and Figures.

RESULTS

Study selection and quality appraisal

The study selection process and quality appraisal results are described in detail in another publication (16). The PRISMA flowchart of the previous publication is provided in the supplementary material Appendix 1. Of the 53 articles included in the previous meta-synthesis, 12 evaluated patients', family members', or healthcare professionals' experiences with multidisciplinary transitional care interventions and hence were included. Two studies (12, 13) were considered of high quality, six studies (11, 21-25) were of moderate quality, and four studies (26-29) were of fair quality (Supplementary material, Appendix 2).

Study and population characteristics

The studies were published between 2013 and 2024 in five countries: Australia (n=4), the Netherlands (n=3), Canada (n=2), the United Kingdom (n=2), and Denmark (n=1). Six studies investigated the perspectives of patients and/or family members, five explored those of healthcare professionals, and one combined the perspectives of patients, family members, and healthcare professionals. Patient populations were older (n=7), stroke (n=3), and former intensive care unit patients (n=2) (Table 1).

Table 1: Characteristics of the included studies

Author, year, country	Aim	Patient population	Professionals delivering the intervention	Work setting	Demographics N [Mean age (range), M/F]	Design and data collection method
Maximos et al., 2024, Canada	To examine the perspectives of healthcare professionals on a community-based, slow-stream rehabilitation, hospital-to-home transition program	Older people	Support staff, not further specified; nurse practitioner; physiotherapist; coordinator	Hospital and primary care	Healthcare professionals: 23[NA(NA), NA]	Semi-structured interviews and focus groups
Kokorelias et al., 2023, Canada	To report older adults' and family members' experiences of receiving services from a hospital-to-home patient navigation program	Older people	Not specified	Hospital and primary care	Patients: 9[79(68-95), 4/5] Family members: 5[60(50-73)2/3]	Qualitative descriptive study using semi-structured interviews
Allen et al., 2022, Australia	To co-design a communication tool to guide conversations about transitional care needs between healthcare practitioners and patients returning to the community	Older people with chronic conditions	Nurse practitioner, social worker, Physician, Physiotherapist, Occupational therapist, Pharmacist, Case manager	Primary care and hospital	Healthcare professionals: 22 [NA (NA), 5/17]	Action research: semi structured interviews and focus groups
Allen et al., 2020, Australia	To evaluate healthcare practitioners' perceptions of the feasibility and acceptability of a communication tool during transition from hospital-to-home	Older people with chronic conditions	Nurse practitioner, physiotherapist, social worker, occupational therapist, pharmacist	Primary care and hospital	Healthcare professionals: 22 [NA (20-70+), NA]	Exploratory descriptive qualitative design; semi-structured interviews
Jepma et al., 2021, The Netherlands	To explore the experiences of participants who received a nurse-coordinated transitional care intervention	Older people with heart conditions	Nurse practitioner; physiotherapist	Primary care and hospital	Patients: 16[82 (71-89), 8/8]	Generic qualitative approach, not further specified; semi-structured interviews

Author, year, country	Aim	Patient population	Professionals delivering the intervention	Work setting	Demographics N [Mean age (range), M/F]	Design and data collection method
Major et al., 2021, The Netherlands	To investigate the feasibility of an interdisciplinary rehabilitation program designed for patients with Post Intensive Care Syndrome transitioning from hospital to home	Former ICU patients	Physiotherapist; dietician; occupational therapist	Primary care	Healthcare professionals: 11[NA(NA), NA]	Mixed method, non-randomized, prospective feasibility study; focus group
Verweij et al., 2021, The Netherlands	To evaluate healthcare professionals' perspectives on the Cardiac Care Bridge nurse-coordinated transitional care intervention	Older people with heart conditions	Nurse practitioner, physiotherapist	Primary care, and hospital	Healthcare professionals: 19[41 (23-62), 2/17]	Mixed methods process evaluation; semi-structured interviews
Harvey et al., 2017, Australia	To describe the care transition experiences of people transitioning from hospital to home who followed a Geriatric Evaluation and Management model and improve that model	Older people	Nurse practitioner, occupational therapist, social worker, physiotherapist, physician, coordinator, not further specified	Primary care and hospital	Patients: 20 [82 (64-95), 12/7] Family members: 19 [NA (NA), NA] Healthcare professionals: 23[NA (NA), NA]	Exploratory, longitudinal case study; semi-structured interviews and focus groups
Lou et al., 2016, Denmark	To investigate how mild stroke patients and their partners experience and manage everyday life in a context of early supported discharge	Stroke	Nurse practitioner; physiotherapist; occupational therapist	Primary care and hospital	Patients: 22 [69 (41-85), 15/22]	Qualitative approach, not further specified; semi-structured interviews
Cobley et al., 2013, UK	To investigate patients' and carers' experiences of early supported discharge services	Stroke	Multidisciplinary specialist rehabilitation, not further specified	Primary care and hospital	Patients 27 [70 (NA), NA] Family members 15 [73 (NA), 2/13]	Thematic analysis; semi-structured interviews
Gustafsson et al., 2013, Australia	To investigate the experiences of people with stroke, during their transition from hospital to home, after participating in an inpatient outreach program	Stroke	Occupational therapist; physiotherapist; speech and language therapist	Primary care	Patients: 7 [61 (36-80), 3/4]	Qualitative approach, not further specified; semi-structured interviews

Author, year, country	Aim	Patient population	Professionals delivering the intervention	Work setting	Demographics N [Mean age (range), M/F]	Design and data collection method
Prinjha et al., 2009, UK	To explore patients' perceptions and experiences of post ICU follow-up services	Former ICU patients	Nurse practitioner; physiotherapist; occupational therapist; physician; psychologist	Primary care and hospital	Patients: 34[52.1(23-76), 20/14]	Qualitative approach, not further specified; semi-structured interviews

Abbreviations: N= number, M= male, F= female, NA= not available, COPD= chronic obstructive pulmonary disease, ICU= intensive care unit

Interventions characteristics

The interventions comprised two to seven components, the most common being a comprehensive discharge needs assessment (n=8), a discharge plan communicated to community care providers (n=4) (pre-discharge), and follow-up home visits (n=6) (Table 3). All interventions involved multidisciplinary teams comprising medical, nursing, or allied health professionals from hospitals and primary care (n=10) or primary care only (n=2) (Table 1).

Facilitators and barriers to implementation

We identified 79 factors influencing the implementation of multidisciplinary transitional care interventions. Table 2 provides an overview of the domains and subdomains of the Consolidated Framework for Implementation Research for which we identified these factors. Figure 1 summarizes all factors organized per phase of transition. Table 4 provides quotes from the studies to illustrate the domains and subdomains of the Consolidated Framework for Implementation Research.

Table 2: Detailed description of identified facilitators and barriers

Facilitators	Barriers
1.Innovation	
Relative advantage	
F1.1 A follow-up appointment after discharge (phone call/visit at home/outpatient clinic) F1.2 Referral to relevant primary care (allied health) professionals, ideally member of a specialized (allied) healthcare network F1.3 A communication tool can support information exchange between and within settings and healthcare professional-patient interaction F1.4 Use of a pre-discharge checklist for healthcare professionals	B1.1 Patients having to arrange follow-up care by themselves B1.2 Information exchange via patients is unsafe/unreliable
Adaptability	
F1.5 Tailoring information provision (appropriate quantity, timing, manner and format) F1.6 Tailoring the intervention according to individual patient goals (finding the right dose, frequency, and intensity not to overload patients)	B1.3 Duplicated, unclear, incorrect, or hard to find information
Complexity	
F1.7 Involving family members from day one (in transitional care decision making) F1.8 Setting shared goals for patients and family members F1.9 Early identification of patients with high-risk of requiring follow-up (allied) healthcare F1.10 Care plan developed by a multidisciplinary (allied) healthcare team addressing patients' medical, nursing, psychosocial, and allied healthcare needs F1.11 Communication tool supports multidisciplinary collaboration between and within settings F1.12 Patients discharged early if they are properly monitored once home and if follow-up care in the community is coordinated	B1.4 Family members need to be educated to support patients B1.5 Lack of emotional and financial support after discharge
Design	
F1.13 Easy to understand transitional care intervention, giving clear expectations to patients, family members, and (allied health) professionals	B1.8 Not getting what was promised in the transitional care intervention B1.9 Unclear goals of the transitional care intervention
Cost	
F1.14 The transitional care intervention is diminishing workload	B1.10 Costs affect continuation of therapy B1.11 Time-consuming transitional care intervention B1.12 Insurance issues B1.13 Costs were reimbursed by the study (subsidy)

Facilitators	Barriers
2.Inner Setting	
Structural characteristics	
F2.1 Being discharged home early enhances recovery and increases adherence to prescribed therapy F2.2 A unique communication system (for both hospital and primary care professionals)	B2.1 Busy hospital environment with an imposed daily schedule B2.2 Lack of activities of daily life participation B2.3 Communication through electronic patient record is not easy B2.4 Administrative burden of the transitional care intervention
Relational connections	
F2.3 Clear roles and tasks division between healthcare professionals F2.4 A team responsible for coordination within and between settings with a problem-solving approach	B2.5 Not having a leader to coordinate the transitional care intervention B2.6 Lack of consistency in work schedules between professionals of different settings B2.7 Lack of coordination between disconnected healthcare providers
Communications	
	B2.8 Unclear ways to communicate/who to contact for healthcare professionals
Relative priority	
F2.5 Early planning of discharge and assistance with arranging home equipment	B2.9 Rushed or sudden hospital discharge for patients
Available resources	
F2.6 Home based therapy can save money F2.7 Allowing enough time for educating healthcare professionals on providing transitional care interventions	B2.10 Healthcare professionals do not have the time for transitional care B2.11 High personnel turnover B2.12 The organization must be able to invest enough money into transitional care B2.13 Patients rushed out of hospitals due to high beds demand B2.14 Lack of specialization/expertise of primary care professionals
3.Outer Setting	
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4.Individuals Involved	
Opinion leaders	
F4.1 Someone in the lead who coordinates the transition from hospital to home	
Innovation deliverers	
F4.2 Healthcare professionals with the correct expertise to adequately support patients during hospital-to-home transitions	B4.1 Imbalance of power between patient and healthcare professional B4.2 Healthcare professionals unaware of each other's needs
Innovation recipients	
	B4.4 Patients who do not want/need help offered through transitional care interventions

Characteristics (need, capability, opportunity, motivation)

Facilitators	Barriers
F4.3 Seeing and interacting with patients as normal persons F4.4 Healthcare professionals have the necessary interpersonal skills to include families F4.5 Patients feeling prepared for discharge F4.6 Patients who feel able to take back control over their lives after discharge F4.7 Patients prefer receiving care from a familiar primary care professional F4.8 Healthcare professionals are enthusiastic about learning new things F4.9 Patients reaching goals become more confident and remain motivated	B4.5 Patients feeling as a burden for their loved ones B4.6 Decreased participation of patients in social activities B4.7 Learning how to care is challenging for low-literate family members B4.8 Hard to adapt for patients when they are at home B4.9 Patients who do not want to go to the hospital again/do not wish receiving help B4.10 Families not having time for themselves B4.11 Low-literate patients require more time and attention B4.12 Overprotective family members B4.13 Shifting relationships between patients and family members during transitions B4.14 Patients feeling emotionally weak/ vulnerable
5.Implementation Process	
Planning	
F5.1 Implementation should be planned early to fit healthcare professionals' and patients' needs and expectations	B5.1 Low adherence
Tailoring strategies	
F5.2 Healthcare professionals should be trained and informed F5.3 Knowing the healthcare system applicable to the region	B5.2 Unclear procedure/pathway for optimal hospital-to –home transitions
Engaging	
F5.4 Healthcare professionals working together towards the same goals, following the same guideline	B5.3 Transitional care intervention not performed as intended B5.4 Involving low-literate carers is challenging for professionals B5.5 Family members are not always available B5.6 Patients having doubts about the transitional care intervention
Reflecting and evaluating	
F5.5 Use of standardized outcome measures to monitor the impact of transitional care interventions	

Innovation

Facilitators and barriers from all studies (two high, six moderate, and four fair-quality) were mapped under five subdomains: *relative advantage*, *adaptability*, *complexity*, *design quality and packaging*, and *cost* (11-13, 21-29).

General factors

Several factors were found to be relevant throughout the entire hospital-to-home transition. The interventions enabled tailored information provision

(*adaptability*) regarding quantity, clarity, correctness, and timing (12, 13, 21-23, 25, 26, 28). They also facilitated personalized and multidisciplinary support provision to help patients achieve their goals by addressing their medical, nursing, psychosocial, and rehabilitation needs (11-13, 21, 24, 26-29). However, the *design* and *cost* of transitional care interventions often threatened implementation success. To ensure adherence and maintain the interventions' *complexity*, the interventions and their objectives had to be clear to patients, family members, and healthcare professionals (12, 13, 21, 23-25, 27). In addition, time-consuming interventions threatened implementation success, especially when health insurance did not cover expenses related to the time spent by healthcare professionals to coordinate care across settings (27, 29).

Pre-discharge factors

In the pre-discharge phase, multidisciplinary transitional care interventions had the *advantage* that they could help identify patients likely to require follow-up (allied healthcare after hospital discharge (11, 12, 22, 26, 27). The interventions ensured that a comprehensive care plan was designed to address patients' medical, nursing, and allied healthcare needs and goals (*complexity*) (12, 13, 24, 26, 27). The referral of patients to the appropriate healthcare professionals in the community was also facilitated, and family members were involved and guided to support their loved ones after hospital discharge (*complexity, relative advantages*) (12, 13, 22, 28). Family members' involvement consisted, for example, of education on how to support patients in their physical and emotional recovery and how to *adapt* their daily routines, everyday activities, and relationships to reduce the burden of recovery (12, 13, 22, 23, 25, 26).

Post-discharge factors

After discharge from the hospital, multidisciplinary transitional care interventions facilitated effective patient-professional communication and information exchange between healthcare professionals across settings. This ensured patients received follow-up care immediately after discharge (*relative advantages*) (11, 12, 22, 23, 25, 27-29).

Table 3: Multidisciplinary transitional care intervention components

Author, year	Pre-discharge intervention components	Post-discharge intervention components
Allen et al., 2020	Improved professional patient communication in-hospital by means of a checklist Discharge planning needs assessment Self-management Family involvement	Self-management
Allen et al., 2022	Improved professional patient communication in-hospital by means of a checklist Discharge planning needs assessment Self-management Family involvement	Self-management
Cobley et al., 2013	Accelerated hospital discharge	Home visits
Gustafsson et al., 2013		Home visits Outpatient service
Harvey et al., 2017	Discharge planning needs assessment Multidisciplinary discharge care plan	
Jepma et al., 2021	Case management Discharge planning needs assessment Multidisciplinary discharge care plan Discharge plan communicated to community care providers	Case management Home visits Continuous needs assessment and evaluation of the care plan after discharge Medication reconciliation
Kokorelias et al., 2023		Case management Monitoring via follow-up appointments
Lou et al., 2016	Discharge planning needs assessment Multidisciplinary discharge care plan Discharge plan communicated to community care providers	Home visits Post-discharge needs assessment and evaluation of the care plan
Major et al., 2021	Discharge planning needs assessment Discharge plan communicated to community care providers	Home visits
Maximos et al., 2024	Case management	Outpatient service Self-management
Prinjha et al., 2009	Discharge planning needs assessment	Monitoring via follow-up appointments
Verweij et al., 2021	Case management Discharge planning needs assessment Multidisciplinary discharge care plan Discharge plan communicated to community care providers	Case management Home visits Continuous needs assessment and evaluation of the care plan after discharge Medication reconciliation

Inner setting

Facilitators and barriers from all studies (two high, six moderate, and four fair-quality) were linked to five subdomains: *structural characteristics*, *relational connections*, *communications, relative priority, and available resources* (11-13, 21-29).

General factors

Although transitional care interventions offered a more efficient work structure and facilitated communication between professionals, several barriers threatened their viability pre- and post-discharge. In some cases, such interventions increased the administrative burden (*available resources*), which healthcare professionals perceived as detrimental since they had limited time to begin with (11, 21, 26, 29). In addition, digital *communication* tools were not easy for everyone, and some healthcare professionals lacked sufficient training to use these tools optimally, which hindered the execution of the interventions (13, 23, 26, 29).

Pre-discharge factors

Some interventions included a digital *communication* platform (structural characteristics) or protocols detailing how and when information should be exchanged between professionals (e.g., during multidisciplinary meetings or individual appointments) (11, 13, 21, 22, 26, 29). This resulted in better discharge planning, sometimes even allowing patients to be discharged earlier (*relative priority*) to continue their recovery at home (12, 23, 25, 28, 29). Early discharge benefited many patients who preferred the safe environment of their home to recover while they reduced the shortage of hospital beds and related costs (*relative priority and available resources*) (13, 22-25, 27-29).

Post-discharge factors

One condition for early discharge to benefit patients and reduce costs was that follow-up care would be available immediately after discharge. However, in some cases, this was impossible due to a lack of expertise of the primary care professionals patients were referred to (*available resources*) (13, 28).

Individuals

Facilitators and barriers from all studies (two high, six moderate, and four fair-quality) were linked to four subdomains: *opinion leaders*, *innovation deliverers*, *innovation recipients*, and *characteristics* (11-13, 21-29).

General factors

Healthcare professionals (*deliverers*) who possessed good interpersonal skills and were trained to consider the preferences of patients and their families regarding the type and quantity of support they required (*characteristics*) resulted in positive experiences for patients and family members (12, 13, 21-28). On the one hand, patients valued being treated in a personable manner and interacting with their healthcare providers, who motivated them and gave them confidence in their ability to recover fully. On the other hand, the continuous training of healthcare professionals in delivering the interventions kept them motivated as they appreciated developing their skills to provide the best care (22-29).

In some cases, healthcare professionals failed to provide adequate support, which hindered the execution of the interventions(22-28). For example, patients with a lower socio-economic status sometimes felt lost when trying to navigate community services because they lacked self-management skills (*recipients' characteristics*). Furthermore, healthcare professionals (*deliverers*) were sometimes unaware of each other's roles, which was one reason they failed to provide tailored support (11, 21, 22).

Pre-discharge factors

During the hospital phase, having a trained or experienced case manager (*opinion leader*) coordinating care who was familiar with patients and aware of the involved healthcare professionals' roles and tasks facilitated the interventions' success (12, 13, 21, 22, 25, 26, 28).

Post-discharge factors

During the home phase, several *characteristics* of patients and family members (*recipients*) facilitated or hindered intervention success. Participating in the intervention and witnessing positive outcomes in their physical, cognitive, and communication abilities motivated patients and family members to adhere to it (13, 23-25, 27). However, when patients had a more sedentary lifestyle and reduced level of participation in meaningful (social) activities, they did not see the benefits of the intervention, which, in turn, hindered their adherence to it(24). Furthermore, some patients and family members refused the intervention because they believed they had enough tools to self-manage recovery (12, 22, 24, 26).

Implementation Process

Facilitators and barriers from six studies (one high, two moderate, and three fair-quality) were linked to *planning*, *tailoring strategies*, *engaging*, and r*eflecting and evaluating* (13, 22, 23, 27-29)

General factors

Standardized outcome measures facilitated monitoring the interventions' impact, thus indicating if adaptation was needed (*reflecting and evaluating*) (13, 23, 28). In addition, understanding the local context, for example, to determine which professionals are best suited to deliver the interventions and how to integrate this with their other tasks facilitated implementation (*tailoring strategies*) (21).

However, several factors hindered successful implementation. In some cases, the interventions were not performed as intended because procedures and protocols were unclear, or there was low adherence because some patients were unaware of the interventions' objectives *(planning, engaging*). In addition, it was often challenging to involve family members as they were unavailable at the same time as healthcare providers (*engaging*) (e.g., because they were working) (22, 29).

Table 4: Example participants' quotes or authors' interpretations

Innovation domain, 12 studies (11-13, 21-29)	
Subdomain	**Example participants' quote and/or authors' interpretation** (quality according to Critical Appraisal Skills Programme score)
Relative advantage	"[…] caregiver participants described how the navigator connected them with appropriate services to meet their informational needs and provided them with opportunities to socialize. As one participant shared, *it wasn't just going to a caregiver support group to learn how to support mental health needs, but it was an opportunity to meet friends and real people in similar situations*- Caregiver, Female, P4. Similarly, the navigators directed clients to appropriate services, assisted them with access those services, and supported their self-advocacy *[…] she [navigator] told me to just try and continue trying, so I started. I almost demanded that I needed the [Community Agency] services and guess what? I got them*- Older Adult, Female, P2."(12) (High quality)
Adaptability	"Many respondents described the information provided as failing to address their own needs and issues of concern: *You read the pamphlets, the leaflets and things, what to look for with strokes, but I mean the thing is, a lot of the things in there weren't applicable* (interview 12; patient)"(23) (Moderate quality)
Complexity	"[…] the TRANSITION tool supported healthcare practitioners to know what to ask, which enabled holistic assessment information to be collected about discharge care needs, identification of problems and referral to allied health […] participants commented that they considered specific domains of the tool were valuable as a guide for "knowing what to ask." These included questions in relation to memory, services available to patients at home, injury risk, medications, instruction and education, and if the patient had any other concerns about going home."(21) (Moderate quality)
Design quality and packaging	*"I think [The program] is designed for people but a certain level of independence and ability to follow through on commands and able to benefit from the program.* (P11)"(13) (High quality)
Cost	*"You can design an intervention program with a desired frequency and for a desired duration but with limited coverage, you run out really quickly. Treatment is so dependent on individual circumstances and that makes it difficult. This patient I have, for example I have let him come for 2 additional months without letting him … paying it myself because he has unemployment benefits only and I thought it important to get him back to how he was before* (physiotherapist)"(27) (Fair quality)
Inner setting domain, 12 studies (11-13, 21-29)	
Subdomain	**Example participants' quote and/or authors' interpretation** (quality according to Critical Appraisal Skills Programme score)
Structural characteristics	"The couples reported that the home atmosphere was less stressful and that they were able to ask questions more freely. *It's just more relaxed... Like, at the hospital I sit in the chair, right? At the patient side of the table. But at home it's different. It's my home ground so the roles are a bit different. She's the visitor. That puts me more in control. In a way.* (Jakob, patient)"(25) (Moderate quality) *"When they first came home, many had felt insecure about no longer being in the safe environment of the hospital."(28)* (Fair quality)

Relational connections	"Participants reported that the community nurse and physical therapist collaborated and with other involved healthcare providers [...] Patient: *Those medicines were changed several times(...).* Interviewer: *Was it difficult for you that they were changed so frequently?* Patient*: No but I do not know which medicines I should have then, then everything is just all let loose [in multi-dose drug dispenser].* Interviewer: *Okay and the community nurse helped with that, I understand?* Patient*: Yes, the hospital told her [community nurse] which ones had to get out.* (P3, male, 81 years)"(22) (Moderate quality)
Communications	"[...] all interviewed healthcare professionals mentioned the value of the collaboration and integrated alternative communication routes such as contact by telephone: *I think we, the physical therapist and I, accomplished a lot. There was a woman, ... She went for groceries with her walker the first day after discharge; and there she sat in the middle of the street. She simply overestimated her situation... Together with the physical therapist we enabled her to do the groceries again; then, you feel satisfied...* (Respondent 8; community nurse)"(29) (Moderate quality)
Relative priority	There was a consensus of preference among participants [...] for returning to their home environment as soon as possible: *Well, I was glad I was going home ... I'm not saying the hospital was horrible, but I just didn't like being in the hospital* (interview 14; patient)"(23) (Moderate quality)
Available resources	"All participants reported that the tool took between 10 and 25 min to use and some participants noted that the tool would be more feasible if more concise"(11)(Moderate quality)
Individuals domain, 12 studies(11-13, 21-29)	
Subdomain	**Example participants' quote and/or authors' interpretation** (quality according to Critical Appraisal Skills Programme score)
Opinion leaders	"Providers stressed the potential of the GP in care coordination to help navigate the service landscape [...]: *[The general practitioner]...knows someone for 30 years... far better that person presents to their general practitioner to have things sorted out than they present to the emergency department.* (Community care provider)"(26) (Fair quality)
Innovation deliverers	"The participants reported that the ESD teams were very knowledgeable and experienced with stroke rehabilitation and that they were able to put themselves in the patient's shoes"(25)(Moderate quality) *"However, participants had some difficulties to mention the specific role of the community care nurse which was primary to recognize health deterioration early."*(22) (Moderate quality)

Characteristics	*"Look, I can do all those exercises, and, in the beginning, you were uhm well then you really had to catch up. But now I just recover in a minute, two minutes and then it is back to normal. So, then you see, you feel that you are building up something and that is important.* (Patient 5, male, 76 years)"(22) (moderate quality) *"A few participants alluded to not being interested in a patient navigation program. Some of these older adults believed that they did not need patient navigation because they are always able to make do alone at home following a hospitalization*-Older Adult, Male, P8."(12) (High quality) "While four clients demonstrated an eagerness for re-engaging with their lives and taking control, there were three clients who expressed a sense of grief in regards to their new lives [...]: *Sitting here, or sitting out there on the veranda, or going for a ride in the car over to [shopping center]; something like that. I just sit there, fairly quiet, very quiet. Very sad, very sad. [...]* These clients were less likely to describe the benefits of STRENGTH and reported experiencing a much more sedentary lifestyle, reduced socialization, increased dependence on others for basic self-cares, and reduced participation in meaningful activities."(24) (Moderate quality)
Implementation process domain, 6 studies(13, 22, 23, 27-29)	
Subdomain	**Example participants' quote and/or authors' interpretation** (quality according to Critical Appraisal Skills Programme score)
Assessing needs	*"Successful implementation of the tool will require a carefully planned strategy to facilitate translation of the tool into the routine practice of ward-based nurses' and support their roles in communication and assessment during older patients' care transitions"*(21) (Moderate quality)
Tailoring strategies	"Implementation of a communication instrument, such as the TRANSITION tool, into practice by ward-based nurses will require consideration of existing practices in order to streamline care processes and minimize service duplication."(21) (Moderate quality)
Engaging	"The collaboration between physical therapists and community nurses was considered valuable to motivate patients when working on the same goals from different perspectives."(29) (Fair quality)
Reflecting and evaluating	"Our findings stress the importance of using carer, in addition to patient, outcome measures for the purposes of evaluating the effective-ness of a rehabilitation service and emphasize the inadequacy of using only traditional patient-centered outcome measures"(23) (Moderate quality) "[...]the implementation of standardized measures in a model of care would be beneficial for communicating patient progress and needs among different care settings, as well as would providing evidence to support the need for the program, to sustain current funding levels, and to advocate for increased expansion and funding in the future."(13) (High quality)

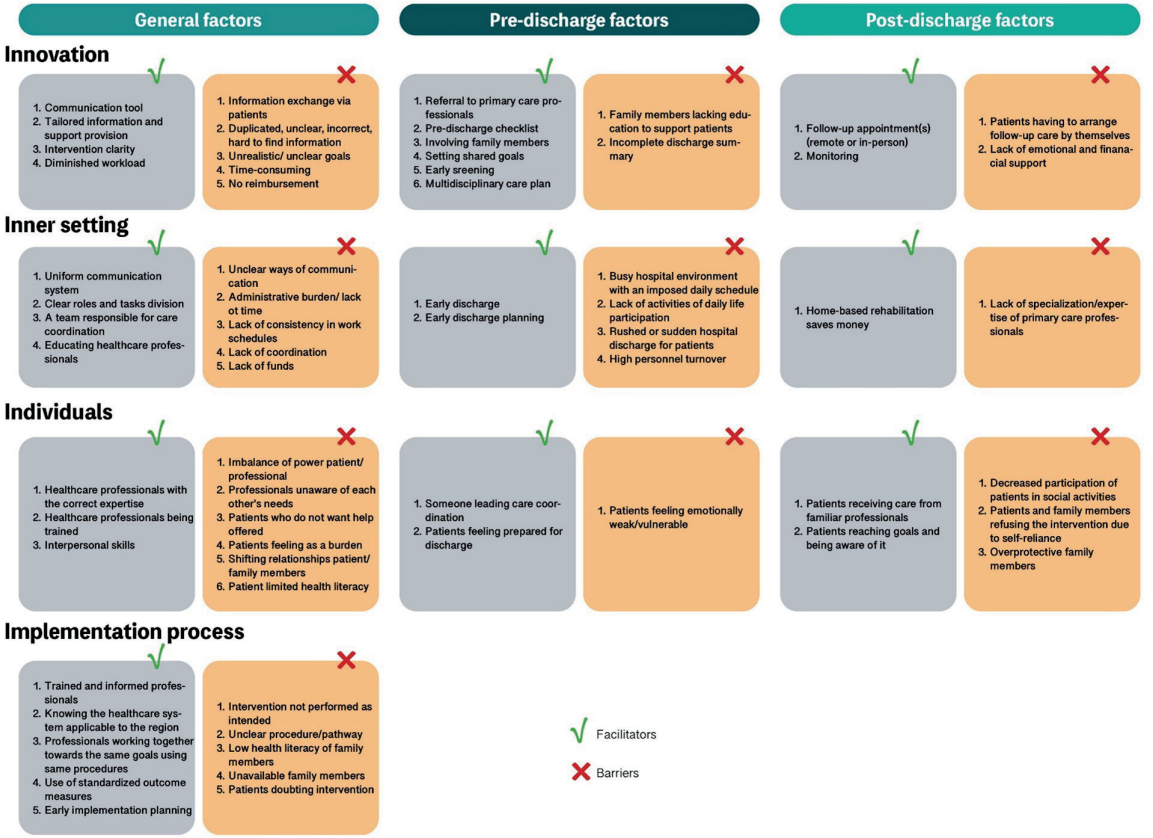


Figure 1: Facilitators and barriers per discharge phase

DISCUSSION

This qualitative review used the Updated Consolidated Framework for Implementation Research to synthesize healthcare professionals', patients', and family members' views on and experiences with multidisciplinary transitional care interventions. It provides insight into potential facilitators and barriers to implementing such interventions. In total, 79 facilitators and barriers were identified. Overall, most facilitators and barriers identified (88%), supported by high-quality evidence, were mapped across three domains of the CFIR: 1) *innovation*: *relative advantage, adaptability, complexity, design quality and packaging, and cost*; 2) *Inner setting: structural characteristics, relational connections, and communications*; 3) *Individuals involved: opinion leaders, innovation deliverers, innovation recipients, and characteristics*. In contrast to these three domains, *the Outer setting* and *Implementation process* domains contained no or a limited number of factors. The main facilitators to implementing multidisciplinary transitional care interventions included "identification of patients' follow-up care needs" and "effective referral to the right professionals" (pre-discharge), "tailored follow-up care in the community" (post-discharge), and "effective communication between stakeholders across settings" (general). The main barriers were "shortage of hospital beds" and "lack of time" (pre-discharge), "lack of available allied healthcare professionals in the community" (post-discharge), and "inconsistencies between stakeholders' schedules" and "intervention costs" (general).

Innovation

Although this systematic review is the first one to provide a comprehensive overview of factors for the successful implementation of multidisciplinary transitional care interventions, previous qualitative reviews have examined the experiences and needs of patients, family members, and healthcare professionals during hospital-to-home transitions for chronically ill patients, stroke survivors, and patients requiring allied healthcare after discharge (16, 30, 31). According to these papers, patients and their families often felt that they were not prepared for discharge during hospitalization, which resulted in them feeling lost once they were home and/or being unable to manage their recovery. Post-discharge, patients were heavily dependent on their family members for their care. At times, family members were unsure how to assist their loved ones with managing their symptoms and performing their daily activities and would have appreciated receiving more support in this. Both patients and family members regretted the lack of follow-up services. Within the *innovation domain* of the implementation framework, the subdomains

relative advantage, adaptability, and *complexity* highlighted that multidisciplinary transitional care interventions could offer a viable solution to address those needs as they facilitate the provision of tailored support and information and the involvement of family members throughout the hospital-to-home transition. Most factors identified within the *innovation domain* were mapped under *complexity*, meaning multidisciplinary transitional care interventions can be complex and include a wide range of components (e.g., family involvement, multidisciplinary care plan, or communication between hospitals and primary care settings). In a recent comprehensive meta-analysis, Tyler et al. investigated whether the effectiveness of mono- and multidisciplinary transitional care interventions differed depending on the number of components they contained (7). They found that interventions with fewer components were more effective in reducing readmissions and mortality than more complex ones. A potential reason could be that simpler interventions may be easier to implement and maintain.

On the other hand, we found that multidisciplinary transitional care interventions did not always address stakeholders' needs and expectations, because of barriers related to the *design quality and packaging* and *cost* subdomains. Regarding *design quality and packaging*, the interventions' objectives were not always clear to patients, family members, or healthcare professionals and were sometimes time-consuming, threatening their sustainability throughout the entire hospital-to-home transition. Hence, ensuring the intervention is 'simple enough', clear, and accessible to all stakeholders and continuously evaluating its processes and execution may promote adherence and sustainable maintenance.

In addition, intervention *cost* and reimbursement issues are challenging to address at the level of care settings. One of the most common healthcare provider payment methods is the fee-for-service model, in which healthcare providers are reimbursed for each service delivered (32, 33). This model lacks incentives to promote quality rather than quantity of care. In recent years, alternative financing models have emerged, such as bundled payments consisting of one-off or periodic payments for various services to provide comprehensive care or value-based payments that reward providers who exceed their performance on quality and cost measures (34, 35). However, there is no conclusive evidence regarding the impact of such financing models for multidisciplinary transitional care interventions, and further research is needed to assess whether these would improve care quality and reduce costs.

Inner setting

Within the *inner setting domain,* we found that multidisciplinary transitional care interventions offered an opportunity to improve the work structure between professionals within the hospital (during the pre-discharge phase) and between those working within and outside the hospital (during the post-discharge phase). Previous qualitative reviews on patients' and professionals' experiences with hospital-to-home transitions identified that ineffective communication between professionals and a lack of standardized work processes hindered effective transitions (16, 31). Professionals also indicated it was unclear whose role it was to coordinate follow-up care. In relation to this, we mapped several facilitators under the *structural characteristics* and *relational connections* subdomains. These factors highlighted that multidisciplinary transitional care interventions have the potential to address negative experiences regarding ineffective communication and lack of formal work processes, as they might provide standardized protocols and infrastructure to ensure effective collaboration and coordination between settings. However, the several barriers identified under *structural characteristics, relational connections*, and *available resources* indicate that, in some cases, multidisciplinary transitional care interventions failed to address stakeholders' needs and expectations during both the pre- and post-discharge phases. Such barriers include high personnel turnover, lack of consistency in work schedules between professionals across settings, or the administrative burden of the interventions. This implies that being fully aware of the situation (settings, healthcare professionals, patient populations involved and healthcare system) before implementing a multidisciplinary transitional care intervention is essential to developing realistic and practical solutions (i.e., "simple enough" interventions).

Furthermore, in recent years, technological tools and health information exchange platforms have been developed to support collaboration across healthcare settings and avoid the administrative burden of double registration (36). These technological tools might be a viable alternative to compensate for staff shortages and facilitate communication between stakeholders. However, such tools are generally poorly implemented, and further research is needed to find solutions to integrate them at a systemic level.

Individuals

Within the *Individuals domain,* our findings indicate that during the pre-and post-discharge phases, the personal *characteristics* of healthcare professionals delivering multidisciplinary transitional care interventions, such as their experience, training, and interpersonal skills, can make patients feel valued

and treated as persons and give them more confidence in their ability to recover fully. This finding aligns with a recent review that examined barriers and facilitators to implementing person-centered care in clinical practice (37). That review found healthcare professionals to play a pivotal role in implementing person-centered care through professional development through training or patient interaction. However, we showed that healthcare professionals sometimes failed to provide adequate support because they lacked expertise/specialization or when patients had lower socioeconomic status or literacy. Patients with lower health literacy levels may have a more limited capacity to self-manage their recovery. Extensive research has been conducted on interventions to improve health literacy in a wide range of patient populations (38). Such interventions consist of, for example, individual or group health counseling sessions, but could also be done through multimedia learning, text, or social media messages and were shown to improve patients' knowledge, activation, self-efficacy, and behaviors (e.g., nutritional behaviors, physical activity). This implies that providing such interventions to patients with lower health literacy could improve their capacity to participate in multidisciplinary transitional care interventions and actively self-manage their conditions. Therefore, when designing future multidisciplinary transitional care interventions, additional efforts should be made to ensure patients are referred to professionals with the right expertise (e.g., through specialized primary care networks) and provide alternative solutions for patients with more limited self-management capacity.

Strengths and limitations

This systematic review is the first to provide insight into facilitators and barriers to implementing multidisciplinary transitional care interventions using the Consolidated Framework for Implementation Research, which can guide strategies for successful implementation. It included an extensive systematic search, a thorough qualitative synthesis using inductive and deductive approaches, and different patient populations. However, some limitations to our study can be identified. First, many researchers participated in the selection process, which may have negatively affected uniformity in article selection. We used sample checks to minimize this selection bias and held regular meetings throughout the screening process to ensure consistency. Second, only twelve articles were included, and we may not have reached thematic saturation. Therefore, readers wishing to implement multidisciplinary transitional care interventions should bear in mind that our list of factors is non-exhaustive and perform a thorough needs assessment of their specific

situations. Third, the included studies were conducted in the European Union, Canada, the United Kingdom, and Australia. Therefore, the results cannot be generalized to contexts that are markedly different from these healthcare systems. Finally, we identified no or very few factors within the *outer setting* and *implementation process* domains, likely because the included studies only investigated user experiences (patients, family members, and healthcare professionals). The experiences and views of researchers or clinicians who developed and implemented the interventions might have provided more insight into these domains. However, such studies are lacking.

CONCLUSIONS

While individual qualitative studies provide insight into a limited number of factors related to the successful implementation of multidisciplinary transitional care interventions, this review provides a comprehensive overview of facilitators and barriers, which can serve as a non-exhaustive inventory list to inspire researchers and clinicians who wish to implement a multidisciplinary transitional care intervention in their settings. They indicate which components of the Consolidated Framework for Implementation Research require particular attention when designing implementation strategies. However, these facilitators and barriers may not all be relevant to specific situations. Therefore, performing a thorough needs assessment specific to the environments, settings, and populations the intervention targets is essential to drawing implementation strategies. Further research is needed to determine how to incorporate the factors identified into strategies for the successful implementation of multidisciplinary transitional care interventions.

Data availability: Data will be available upon request via DataVerseNL: https://doi.org/10.34894/9HACDB

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APPENDICES





Chapter 9

A transmural allied healthcare pathway (TULIP) – A multi-methods process evaluation

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ABSTRACT

Introduction and aims

The transmural allied healthcare pathway (TULIP) was developed to improve interprofessional collaboration and continuity of care during hospital-to-home transitions for patients with complex care needs. This process evaluation aimed to examine the implementation and integration of TULIP into routine care.

Methods

A multi-methods process evaluation guided by the RE-AIM framework assessed reach, effectiveness, adoption, implementation, and maintenance. Data were collected through interviews, focus groups, and surveys with professionals, patients, and managers across hospital, geriatric rehabilitation centers, and primary care settings.

Results

Reach included 84 healthcare professionals across hospital, geriatric rehabilitation, and primary care settings; patient enrollment was limited due to a small eligible population. Effectiveness showed a slight improvement in the consistency of care delivery among active users, with no significant changes in perceived collaboration or work performance, although limited intervention uptake may have constrained the assessment of potential effects. Adoption varied across professionals and settings and relied heavily on the implementation researcher, indicating limited organizational ownership. Implementation was hindered by intervention complexity, differing task perceptions among professionals, and challenges in cross-setting coordination and patient eligibility. Maintenance was considered unlikely without structural organizational support, integration into existing workflows, and a clearly perceived need among professionals.

Conclusions

Sustainable implementation of TULIP requires stronger organizational commitment, clear roles and responsibilities, and integration into routine workflows to support the continuity of care during hospital-to-home transitions.

INTRODUCTION

Patients with complex care needs, defined as patients who require multidisciplinary, coordinated care due to a combination of medical, functional, and social challenges, often experience fragmented care after hospitalization. This fragmentation can lead to adverse outcomes, such as functional decline, readmissions, and reduced quality of life (1, 2). Transitional care interventions, also referred to as transmural care, aim to bridge the gap between hospital and primary care by ensuring coordination and continuity of care (2). Allied health professionals, such as physio- and occupational therapists and dieticians, play an important role in the functional recovery of patients during and after hospitalization. Interdisciplinary communication and collaboration between these professionals enable tailored support that addresses the individual needs of patients and their families (3-6). The transmural allied healthcare pathway (TULIP) was developed to improve coordination and continuity of allied healthcare services during hospital-to-home transitions, thereby supporting patients and their families in regaining independence and optimizing recovery after hospitalization (7).

To have a meaningful impact on patients, healthcare professionals and organizations, transitional care interventions need to be widely adopted, effectively implemented, and sustained in routine transmural care. Barriers to sustainable implementation of transitional care interventions include unclear communication pathways, the time-consuming nature of interventions, and inconsistencies between professionals' schedules (8). TULIP sought to address these barriers by selecting specific implementation strategies to support a successful uptake (8). Yet, whether and how these strategies are applied in practice has not been evaluated.

To better understand the implementation process of TULIP in clinical settings, a multi-methods process evaluation was conducted. This study follows the Reach, Effectiveness, Adoption, Implementation, and Maintenance (RE-AIM) framework, a commonly used model in implementation research (9). Given TULIP's focus on strengthening interprofessional collaboration across settings, this process evaluation examined how interprofessional collaboration was integrated into clinical practice. It also identified strengths, challenges, and areas for improvement.

METHODS

This study is part of the TULIP-project (1, 2, 7, 8, 10-13). A multi methods process evaluation was conducted between September 2024 and February 2026. The Medical Ethics Committee of the Amsterdam University Medical Centers (AUMC) provided a waiver for this study (METC 2024.0512). Informed consent was obtained from all participants.

The transmural allied healthcare pathway (TULIP)

TULIP was implemented at three clinical departments of the AUMC (department of internal medicine and orthopedic/trauma surgery), within five geriatric rehabilitation centers in the Amsterdam region and the primary care practices where patients were referred to after discharge. TULIP was developed using an Intervention Mapping approach, which is described in detail elsewhere (7). The intervention aimed to improve the transition from hospital to home for patients with complex care needs by influencing allied healthcare professionals' behavior and clinical care processes.

TULIP consisted of six key components: (1) early identification of allied healthcare needs using a checklist for nurses on the wards to consult allied healthcare professionals, (2) appointing a coordinator for the patient to support the hospital-to-home transition from allied healthcare perspective, (3) active involvement of patients and families in conversations and advice for continuing allied healthcare after hospitalization, (4) a standardized handover using a digital communication platform accessible for patients, families and healthcare professionals from different settings, (5) referral within specialized allied healthcare networks, and (6) structured follow-up by the coordinator within 2 weeks after hospital discharge.

Stakeholders

The following stakeholders engaged in the development and implementation of TULIP:

- Nurses and allied healthcare professionals, i.e. physical therapist, occupational therapist, speech- and language therapist, or dietitian, working at one of the participating wards of the AUMC, in a geriatric rehabilitation center, or in primary care in the Amsterdam region;
- Patients admitted to one of the participating wards of the AUMC and receiving care from at least two allied healthcare professionals during hospitalization and their families;

- Management and ICT personnel affiliated with the AUMC;
- Digital communication platform representatives (i.e. ZorgDomein);
- Members of the research team responsible for guiding the implementation, data collection and overall coordination and facilitation of all other stakeholders involved.

Stakeholders were purposively recruited through Amsterdam UMC and the professional networks of the researchers to include healthcare professionals from hospital, geriatric rehabilitation, and primary care with expertise in transitional allied healthcare.

Implementation strategies

To facilitate the implementation of TULIP, an implementation plan was developed, incorporating strategies from the Expert Recommendations for Implementing Change (ERIC) tool, see table 1 (14). This tool was filled out based on information obtained in our previous research (1, 2, 8, 11, 12). The selected strategies were operationalized with stakeholders involved in TULIP in group discussions.

Table 1: Implementation strategies TULIP

Implementation strategy	Operationalization	Stakeholders involved
Identify and prepare key users	Key users were appointed who performed the following actions: -spread knowledge and information among colleagues -perform actions on the ward such as putting posters on the walls to inform colleagues	Per ward two nurses and two physical therapists
Audit and provide feedback	Weekly face-to-face meetings with researchers and healthcare professionals to discuss implementation and evaluation measures using an implementation dashboard	Hospital allied healthcare professionals from the wards, management
Distribute educational materials	A range of educational materials, including posters, newsletters, videos, a website, and a pop-up notification in the EHR were developed to increase awareness and knowledge, support consistent implementation, and sustain engagement over time.	Hospital and primary care allied healthcare professionals, management

The RE-AIM framework

The RE-AIM framework provides a structured and comprehensive approach to assess the impact and sustainability of TULIP (9). Table 2 presents an overview of the operationalization of each RE-AIM component in this study, including

the quantitative and qualitative data sources used. In the text below, we provide a narrative explanation of how the RE-AIM framework was applied, complementing the information in the table.

Reach: was assessed by recording the number of participating allied healthcare professionals, as they were the primary target group of TULIP. Additionally, we recorded the number of patients enrolled in TULIP by these professionals.

Effectiveness: was evaluated by assessing healthcare professionals' perceived interprofessional collaboration and work performance before and after implementation of TULIP. Measurements included a collaboration survey, the Individual Work Performance Questionnaire (IWPQ), and additional questions regarding their involvement in TULIP. Participating allied healthcare professionals were recruited by JvG and OvB and completed the questionnaires pre- and post-implementation.

The collaboration survey, developed by the research team, covered *shared decisions and goals, interprofessional values and ethics, communication, uniformity, reflection,* and *roles and responsibilities*, rated on a 0–10 scale. The IWPQ assessed *task performance, contextual performance,* and *counterproductive work behavior* using a 5-point Likert scale (15).

Patient outcomes were evaluated using the PROMIS Physical Function Short Form 8b, the EQ-5D-5L (16, 17), a healthcare utilization survey, and electronic health record data. Two patient cohorts, pre-implementation (Sept 2024–Jan 2025) and post-implementation (Jul–Sept 2025), were recruited and assessed by MvB, KO, TH, RC, and JvG at one and twelve weeks after discharge.

Adoption: reflects initial willingness of professionals to engage with TULIP. This was explored qualitatively through interviews and focus groups with healthcare professionals, focusing on motivations, expectations, and early experiences that influenced engagement.

Implementation: captured how TULIP was delivered in practice, including adherence to intended procedures and strategies, adaptations made, and satisfaction across stakeholders. Qualitative interviews conducted after implementation by MvB and weekly meeting notes documented by JvG provided insight into practical challenges, context-specific adjustments, and the perceived value of TULIP.

Maintenance: explored intended long-term use of TULIP. Interviews focused on sustainability considerations, potential barriers, and facilitators for continued implementation in different settings. The Net Promoter Score measured

whether allied healthcare professionals would recommend TULIP to colleagues, rated from −100 to +100 (18).

Table 2: RE-AIM component matrix

		Quantitative					Qualitative		
RE-AIM	**Operationalization used in this study**	EHR analytics	Implementation dashboard	Patient surveys pre- and post-implementation	Allied HCP surveys pre- and post-implementation	HCP interviews, focus groups post implementation	Patient interviews post implementation	Manager interviews post implementation	Field notes and observations during implementation
Reach: Professionals and patients who participated in TULIP									
	Number of allied HCPs that participated in TULIP		X						
	Number of patients that were selected for TULIP by allied HCP's	X	X			X			
Effectiveness: Preliminary effectiveness of TULIP on allied healthcare professionals perceived collaboration and work performance, and secondary on patients' clinical and patient-reported outcomes									
	Allied healthcare professionals								
	Self-reported effect of TULIP on: - allied HCP's experienced interprofessional collaboration - work performance				X	X			
	Patients								
	Characteristics of hospital stay: readmissions, length of stay, mortality, ED visits and healthcare utilization	X		X					
	The effect of TULIP on patients' physical functioning and quality of life			X					

	Quantitative				Qualitative		
Adoption: Reasons for adoption and non-adoption of TULIP							
Reasons why allied HCPs wanted to adopt or non-adopt TULIP				X		X	X
Implementation: Experience and satisfaction with TULIP of HCP's, patients and managers							
The number of patients that HCPs enrolled in TULIP	X	X		X		X	
HCP's perceived use per component of TULIP				X			X
HCP's perceived experience with the implementation strategies				X			X
HCP's satisfaction with TULIP				X			X
Patient satisfaction with TULIP					X		
Manager's satisfaction with TULIP						X	X
Maintenance: Information on the sustainability and applicability of TULIP							
Reasons for the use of TULIP on the long term and in other settings			X	X		X	X

Abbreviations: RE-AIM: reach, effectiveness, adoption, implementation maintenance: TULIP: transmural allied healthcare pathway: EHR: electronic patient record: EQ-5D-5L: EuroQol five-dimension five levels survey: PROMIS SF PF: patient reported outcome measurement information system short form physical functioning: IWPQ: individual work performance survey, ED: emergency department, HCP: healthcare professional

Data analysis

No sample size calculation was performed prior to the commencement of this study, as this exploratory study primarily focused on assessing implementation rather than effectiveness. Quantitative data were collected between September 2024–December 2025 and were analyzed in IBM SPSS Statistics 26 (IBM Corp). Normality was tested with the Kolmogorov–Smirnov test. Data of patients and allied healthcare professionals were reported as mean ± SD, median (IQR), or frequencies. Within- and between-group comparisons were restricted to participants with complete data at both T0 and T1 using paired-sample t-tests for allied healthcare professional data and independent-samples t-tests for patient data. Significance was set at $P \leq 0.05$.

Qualitative data were collected between January 2025 and December 2025. Interviews and focus groups were audio-recorded, transcribed verbatim with Amberscript, and manually verified. Data were analyzed in MAXQDA 2022 using a deductive framework analysis (19), guided by the RE-AIM framework, supplemented by inductive development of subthemes within selected domains (9). The process included familiarization, coding, mapping to RE-AIM dimensions, and identifying mechanisms influencing adoption, implementation and sustainability. Two researchers (JvG and SW) independently analyzed the first transcripts, after which a third researcher (MvdL) reviewed the coding for consistency. JvG analyzed the remaining transcripts, and reflexivity meetings with FN, SW, MvdL, and JvG enhanced transparency and trustworthiness (20). No member check was performed.

RESULTS

Regarding the qualitative data, a total of 20 healthcare professionals and managers participated in interviews, which lasted 17–44 minutes. Five focus groups were conducted with 4–12 allied healthcare professionals per group, including physiotherapists, occupational therapists, speech and language therapists, and dietitians, and lasted approximately one hour. Eight professionals participated in both an interview and a focus group. In addition, six patients participated in qualitative interviews lasting 12–28 minutes.

Reach

Number of healthcare professionals that participated in TULIP

A total of 84 allied healthcare professionals participated in the TULIP project. Of these, 49 (58%) worked in primary care, 28 (33%) at Amsterdam UMC,

and seven (9%) in geriatric rehabilitation. The primary care professionals represented 36 primary care practices across the Amsterdam region. Hospital professionals worked within the two hospital departments participating in TULIP. The geriatric rehabilitation professionals were affiliated with three organizations providing geriatric rehabilitation care in the Amsterdam region. Participants included 37 (44%) physical therapists, 21 (25%) occupational therapists, 21 (25%) dietitians and 5 (6%) speech and language therapists.

Number of patients that were selected for TULIP

Between 27 January and 1 November 2025, a total of 96 patients received (parts of) TULIP. During the study period, 662 screening assessments were conducted among 306 individual patients (472 at internal medicine and 190 at trauma and orthopedic surgery). As part of the study protocol, patients were screened weekly during hospital admission. Because patients could also be readmitted during the study period, some patients contributed multiple screening assessments. More patients were eligible for TULIP (were treated by ≥2 allied healthcare professionals and discharged home or to a geriatric rehabilitation center) at the internal medicine department (n = 60) than at the departments of trauma- and orthopedic surgery (n = 36).

The implementation of TULIP was influenced by recurring challenges related to patient eligibility. Many patients struggled with issues, such as psychiatric problems, homelessness, lack of insurance, or language barriers, which made them ineligible for participation in TULIP. In addition, some patients declined the offered support (for example, arranging aftercare) or were unable to decide about continuing allied healthcare because they already had too much on their mind during hospitalization.

> *"Patients are increasingly complex; some have extensive psychiatric issues requiring specialized care or, conversely, avoid care altogether. In other cases, additional factors play a role, such as lack of insurance, which leads them to not continue allied healthcare in primary care."* (Physical therapist 3).

This resulted in a small number of patients who were eligible to participate in (parts of) TULIP. Consequently, awareness and engagement with TULIP among allied healthcare professionals remained low. This limited visibility caused some professionals to overlook eligible patients, which in turn reinforced the perception that TULIP was not widely applicable.

"I use it so rarely, that I did not develop any real experience with it." (Physical therapist 1).

Effectiveness

Allied healthcare professionals' experienced interprofessional collaboration and work performance

Of all 84 allied healthcare professionals that participated in TULIP, a total of 62 professionals completed surveys on interprofessional collaboration and work performance prior to the implementation of TULIP, of whom 43 (69%) were physical therapists, 9 (15%) occupational therapists, 9 dietitians (15%) and 1 (1%) speech- and language therapist. Approximately half of them worked in hospital or geriatric rehabilitation centers, while the other half worked in primary care (Table 3). Of the allied healthcare professionals who completed the pre-implementation survey, 44 (71%) also completed the post-implementation survey and were included in the analysis assessing changes in interprofessional collaboration and work performance before and after the implementation of TULIP. Most follow-up non-responders were primary care professionals, consistent with their limited engagement in TULIP. Among those who completed the post-implementation survey, 31 (70%) reported having learned about TULIP through social media updates or by attending a meeting, while eight (18%) indicated no involvement with TULIP. Only six professionals (14%) reported having used TULIP in clinical practice more than once; these respondents were predominantly hospital-based professionals (Table 4).

Table 3: characteristics of allied healthcare professionals

Number	62
Age, years (mean ± SD)	43 ± 13.0
Gender, female, n (%)	46 (74.2)
Educational level, n (%)	
Bachelor	37 (59.7)
Master	25 (40.3)
Profession, n (%)	
Physical therapist	43 (69.4)
Occupational therapist	9 (14.5)
Speech- and language therapist	1 (1.6)
Dietitian	9 (14.5)
Work experience, years (mean ± SD)	17 ± 2.0
Setting, n (%)	
Primary care	
• Solo practice	3 (4.8)
• Monodisciplinary practice	11 (17.7)
• Multidisciplinary practice	15 (24.2)
Hospital	28 (46.8)
Geriatric rehabilitation center	5 (6.3)
Collaboration survey (mean ± SD per construct)	
Shared decisions and goals	7.3 ± 1.6
Interprofessional values and ethics	7.6 ± 1.3
Communication	7.0 ± 1.6
Uniformity	6.2 ± 1.7
Reflection	5.7 ± 2.3
Roles and responsibilities	8.0 ± 1.3
Work performance (mean ± SD per construct)	
Task performance	2.7 ± 0.7
Contextual performance	2.4 ± 0.7
Counterproductive work behavior	1.2 ± 0.7

Abbreviations: IQR=inter quartile range, n=number, SD=standard deviation, n=number, IWPQ= interprofessional work performance survey

Table 4: Self-reported experience with TULIP

Number	44
Involvement in TULIP, n *(multiple responses were allowed)*	
None	8
I have read newsletters or LinkedIn posts	16
I have attended a live meeting	18
I have an account for the digital communication platform	10
I have treated a patient following the TULIP care pathway	4
I am actively involved by the researcher	12
Perceived experience with TULIP, n	
Not at all	19
Once or very occasionally	19
Regularly	4
Often	1
Very often	1

For interprofessional collaboration, allied healthcare professionals reported the highest scores for *roles and responsibilities*, indicating clarity about who was responsible for what within the care for patients with complex care needs, and the lowest score for *reflection,* both before and after implementation of TULIP (Table 5). Differences in interprofessional collaboration before versus after TULIP implementation were small and not statistically significant across subdomains. After excluding professionals who reported no perceived experience with TULIP (n=19), the pattern of results remained largely similar, with *roles and responsibilities* scoring highest and *reflection* lowest. Differences between pre- and post-implementation were small for most subdomains. However, among TULIP users, a significant improvement was observed in *uniformity*, indicating greater consistency in care delivery. No other significant changes were found (Table 5).

In focus groups conducted after the questionnaire data collection, allied healthcare professionals explained that clear *roles and responsibilities* facilitate collaboration, as illustrated by the following quote:

> *"If you can explain what someone's role is, in this case a dietitian, I think you can more quickly assess whether a patient would benefit from support of this professional."* (Primary care physical therapist, 1).

Furthermore, focus group participants reported little attention to *reflection* on collaboration, and when *reflection* did occur, it was limited to specific patient treatment cases.

> *"I participate in intervision, but then we talk about a specific patient case, not about how we collaborated in this or future cases"* (Primary care physical therapist, 2).

For work performance, the highest scores were reported for *task performance* and the lowest for *counterproductive work behavior*, both before and after TULIP implementation (Table 5). Changes in work performance following TULIP implementation were small and largely not statistically significant across subdomains. After excluding professionals with no perceived TULIP experience, results were similar, with only a significant increase in *counterproductive work behavior* among TULIP users (Table 5).

Table 5: Interprofessional collaboration and work performance outcomes of allied healthcare professionals

	Primary analysis				Sensitivity analysis			
	Pre-implementation	Post-implementation	Mean difference (95% CI)	*P*	Pre-implementation (TULIP users)	Post-implementation (TULIP users)	Mean difference (95% CI)	*P*
Number	44	44			25	25		
Collaboration survey (mean ± SD per construct)								
Shared decisions and goals	7.4 ± 1.7	7.3 ± 1.0	-0.1 (-0.6 : 0.4)	0.756	7.1 ± 1.9	7.6 ± 0.9	0.5 (-0.3 : 1.3)	0.227
Interprofessional values & ethics	7.6 ± 1.3	7,7 ± 1.1	0.1 (-0.4 : 0.3)	0.722	7.6 ± 1.4	7.7 ± 1.3	0.1 (-0.4 : 0.6)	0.674
Communication	7.0 ± 1.2	7,1 ± 1.1	0.1 (-0.2 : 0.4)	0.449	7.1 ± 1.3	7.3 ± 1.1	0.2 (-0.2 : 0.7)	0.238
Uniformity	6.0 ± 1.6	6.4 ± 1.6	0.4 (-0.1 : 0.9)	0.135	6.0 ± 1.7	6.8 ± 1.5	0.8 (0.2 : 1.4)	**0.010**
Reflection	5.6 ± 2.3	5.6 ± 1.9	0.0 (-0.6 : 0.7)	0.971	5.5 ± 2.2	6.0 ± 2.0	0.5 (-0.3 : 1.3)	0.234
Roles and responsibilities	8.1 ± 1.3	8.2 ± 1.2	0.1 (-0.3 : 0.6)	0.563	8.1 ± 1.1	8.4 ± 1.2	0.4 (-0.3 : 1.0)	0.261
IWPQ (mean ± SD per construct)								
Task performance	2.7 ± 0.6	2.7 ± 0.7	0.0 (-0.2 : 0.2)	0.808	2.7 ± 0.6	2.8 ± 0.6	0.1 (-0.1 : 0.3)	0.357
Contextual performance	2.4 ± 0.7	2.5 ± 0.8	0.1 (-0.1 : 0.3)	0.444	2.5 ± 0.7	2.4 ± 0.8	-0.1 (-0.4 : 0.2)	0.584
Counterproductive work behavior	1.2 ± 0.7	1.4 ± 0.7	0.2 (0.0 : 0.3)	**0.046**	1.2 ± 0.7	1.4 ± 0.8	0.2 (0.0 : 0.4)	**0.034**

Abbreviations: Interprofessional collaboration survey scores range from 0-10 (0=low, 10=high), IWPQ=interprofessional work performance survey scores range from 0-5 (0=seldom, 5=always), CI=confidence interval

Patients' physical functioning and quality of life

A total of 33 patients were included in the pre-implementation group and 33 in the post-implementation group. Missing data occurred in the pre-implementation group for 8 (24%) participants at T0 and 12 (36%) at T1, and in the post-implementation group for 4 (12%) at T0 and 13 (39%) at T1, due to death (n=4), withdrawal (n=4), or loss to follow-up. The groups differed on several baseline characteristics. The pre-implementation group included a higher proportion of women, had longer hospital stays, had a higher BMI and more frequently required ICU admission compared to the post-implementation group.

Healthcare utilization during hospitalization was high in both groups. Many patients were referred to geriatric rehabilitation centers after discharge: 25 (76%) in the pre-implementation group and 21 (64%) in the post-implementation group. After discharge, GP follow-up was common: 14 (42%) participants in the pre-implementation group and 13 (39%) in the post-implementation group. Emergency department presentation was higher in the post-implementation group, 16 (48%) compared with 5 (15%) in the pre-implementation group. Allied healthcare utilization after discharge was limited, with most patients engaging only in physical therapy and very few accessing occupational therapy or dietetic support.

Table 6: characteristics of patients

	Pre-implementation	**Post-implementation**
Number	33	33
Age years, mean ± SD	63 ± 17.0	64 ± 16.0
Gender female, n (%)	18 (54.5)	9 (27.3)
BMI mean ± SD	27 ± 8.0	25 ± 8.0
Social situation n (%)		
Living alone	17 (51.5)	14 (42.4)
Living with a partner	7 (21.2)	15 (45.5)
Missing	9 (27.3)	4 (12.1)
Educational level, n (%)		
None	0 (0.0)	2 (6.1)
Lower education	11 (33.3)	4 (12.1)
Intermediate education	4 (12.1)	11 (33.3)
Higher education	9 (27.3)	12 (36.4)
Missing	9 (27.3)	4 (12.1)
Work situation n (%)		
Paid job	5 (15.2)	9 (27.3)
Household	1 (3.0)	1 (3.0)
Pension	13 (39.4)	8 (24.2)
No work due to health condition	5 (15.2)	6 (18.2)
No work due to other reasons	0 (0.0)	5 (15.2)
Missing	9 (27.3)	4 (12.1)

	Pre-implementation	Post-implementation
Nursing department n (%)		
Internal medicine	22 (66.6)	17 (51.5)
Orthopedic/Trauma surgery	11 (33.4)	16 (48.5)
Allied healthcare utilization during hospitalization		
Number of visits per patient, median (IQR)		
Physical therapy	12 (8-26)	8 (5-14)
Occupational therapy	2 (0-8)	1 (0-3)
Dietitian	4 (2-7)	4 (2-6)
Speech- and language therapy	0	0
Length of stay days, median (IQR)	26 (19-52)	18 (13-29)
ICU admission n (%)	12 (36.4)	3 (9.0)
Discharge destination n (%)		
Home	7 (21.2)	12 (36.4)
Geriatric rehabilitation center	25 (75.8)	21 (63.6)
Other	1 (3.0)	0
30-day readmission n (%)	5 (15.2)	6 (18.2)
3 months readmission n (%)	7 (21.2)	12 (36.4)
Mortality n (%)	2 (6.1)	2 (6.1)
Healthcare utilization after hospitalization, n		
General practitioner visit	10	11
Phone call general practitioner	4	2
Emergency department visit	5	16
Missing	9	13
Allied healthcare utilization after hospitalization, n		
Physical therapy	9	13
Occupational therapy	5	5
Dietitian	5	3
Speech- and language therapy	0	0
Missing	9	13

Abbreviations: SD=standard deviation, n=number, IQR=inter quartile range, ICU=intensive care unit, BMI=body mass index

Table 7: Quality of Life and Physical Functioning outcomes patients

	Pre-implementation group Mean ± SD Δ T1- T0	**Post-implementation group** Mean ± SD Δ T1- T0	**Mean diff.** (95% CI)	***P***
Number	19	19		
EQ-5D-5L				
Index	0.028 ± 0.255	0.034 ± 0.316	0.0 (-0.2 : 0.2)	.496
VAS	6.6 ± 19.7	8.1 ± 11.5	-1.5 (-12.1 : 9.1)	.061
PROMIS PF SF 8b				
T score	3.4 ± 7.3	4.0 ± 8.3	-0.6 (-5.6 : 4.5)	.785

Abbreviations: SD=standard deviation, EQ-5D-5L=EuroQol five dimensions five levels, VAS=visual analog scale, PROMIS PF SF 8b=patient reported outcome measurement information system physical function short form 8b. EQ-5D-5L ranges from 0-5 (0=no problems, 5=extreme problems), PROMIS PF SF 8b ranges from 0-5 (0=easily, 5=cannot do it), T0=1 week after discharge, T1=12 weeks after discharge, CI=confidence interval

Both health-related quality of life and PROMIS PF scores were low at baseline (T0, one week after hospital discharge) in both groups (Table 7)(17). The mean differences between T0 and T1 were comparable across groups, with no statistically significant between-group differences (Table 7).

Adoption

Theme 1 – Readiness for innovation

Openness to innovation varied across allied healthcare professionals and appeared to influence their engagement with TULIP. Those who embraced innovation projects often acted as early adopters within their department, showing enthusiasm toward new ideas and initiatives aimed at improving patient care. They valued their input was recognized and described innovation as an integral part of working in an academic environment.

> *"The idea is good and innovative, and the co-creation sessions were very useful and valuable."* (Hospital occupational therapist 1).

In contrast, limited openness to innovation was commonly mentioned by allied healthcare professionals and managers related to high workload and time pressures, as well as a perceived tension between professional autonomy and top-down directives.

> *"Direction needs to come from higher levels of the organization; we cannot achieve this independently."* (Hospital physical therapist 4).

> *"The physiotherapists work very autonomously; they want to decide for themselves what they participate in, otherwise they don't feel the urge to do it"* (Manager 1).

Some allied healthcare professionals also described a general sense of fatigue towards new projects or feeling constrained by established routines, which hindered proactive engagement with change initiatives.

> *"I am already involved in other projects, so I do not need to be engaged in yet another one."* (Hospital physical therapist 7).

Theme 2 – Task perception

Perceptions of how TULIP aligned with allied healthcare professionals' roles varied considerably. Those who viewed TULIP as part of their responsibilities appreciated the improved oversight of the hospital-to-home transition and perceived benefits for patients through its structured approach. They emphasized the importance of interprofessional collaboration and saw TULIP as supporting continuity and integration of care, particularly highlighting the role of allied healthcare professionals.

> *"It is valuable for us to have oversight of the hospital-to-home transition, as this supports the quality of care for our patient population."* (Hospital dietitian 1).

Other allied healthcare professionals were less convinced, expressing uncertainty about post-discharge responsibilities and a reluctance to intervene treatments of other colleagues. For some, TULIP's purpose and added value were not fully clear, which limited their sense of ownership. TULIP was sometimes perceived as optional and adding workload, hindering full adoption. Additionally, allied healthcare professionals described TULIP as difficult to fit into their daily work routines. Allied healthcare professionals and managers noted furthermore that meaningful improvement would require broader behavioral change among allied healthcare professionals.

> *"It is mostly valuable for colleagues in primary care or geriatric rehabilitation, but I am not sure what it offers me, as I no longer treat the patient after hospital discharge."* (Hospital physical therapist 4).

Implementation

Theme 3 – TULIP key components

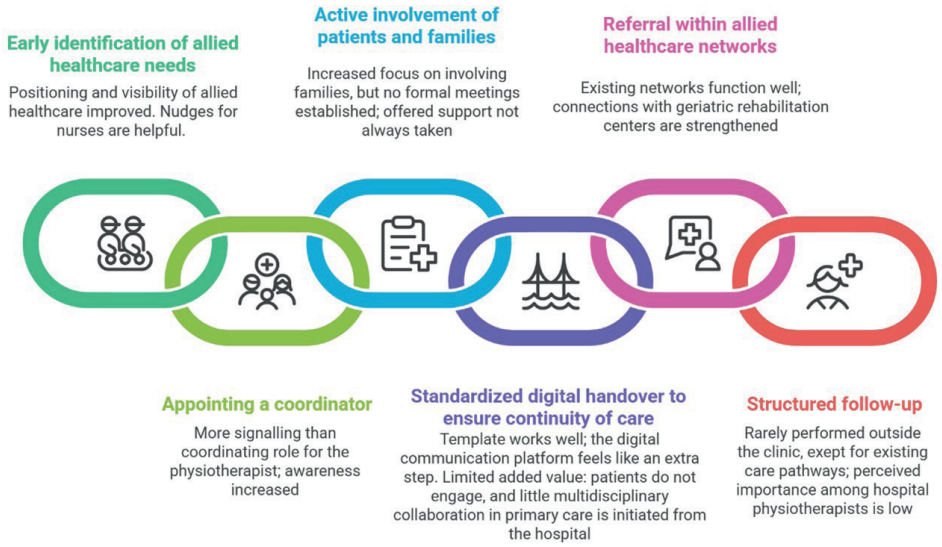


Figure 1: TULIP key components

Early identification of allied healthcare needs: Presence and visibility of allied healthcare professionals on the ward was perceived as essential, as nurses continue to have the clearest overview of daily patient care. Nurses preferred visual reminders on the ward to prompt consultation of allied healthcare. Such visual nudges also supported the onboarding of new nursing staff. Prompts embedded in the EHR were considered less helpful due to the already high documentation burden. Despite these visual reminders, timely consulting allied healthcare remained a point of attention due to the short length of hospital stays and competing clinical priorities.

> *"We clearly see the identification poster on the wards as an improvement, we use it very often, also for students or new colleagues"* (Nurse 1).

Appointing a coordinator: Physical therapists recognized their signaling role in the care of patients with complex care needs. Some expressed concerns that this role would require substantial additional time, leading to hesitancy in fully adopting it, while others perceived it as part of their existing responsibilities. Nevertheless, during interviews it was mentioned that the project increased

overall awareness among physical therapists of the importance of coordinated care during hospital-to-home transitions.

> *"I have become more aware of our coordinating role in the patients' recovery."* (Hospital physical therapist 3).

Active involvement of patients and families: Healthcare professionals acknowledged the importance of involving family members, but practical barriers often made this difficult. Families were usually present only during visiting hours, and scheduling dedicated meetings was not part of routine care due to time constraints or families being hard to reach or overwhelmed. Overall, TULIP increased awareness of family involvement, which, although not always achieved as intended, was highly valued by patients and families when it occurred. Patients reported feeling more secure when information was shared with family members, as this enabled them to process the information together.

> *"Involving family is a bit tricky; sometimes I just happen to run into them, but I don't schedule separate appointments with them."* (Hospital physical therapist 1).
>
> *"The dietitian explained very clearly to me and my partner what I needed to arrange when I arrived home, what was helpful".* (Patient 3)

Standardized digital handover to ensure continuity of care: The digital communication platform was considered user-friendly and allowed professionals to see immediately which colleagues were involved in a patient's care. It facilitated communication across care settings while protecting patient privacy and was particularly useful for patients with frequent hospitalizations. Primary care professionals were open to using the platform for collaboration. Reported drawbacks included the lack of integration with existing electronic health record systems, the need to obtain patient consent, which was sometimes overlooked, and limited patient engagement. Minor technical issues during the initial implementation phase also hindered full adoption.

> *"Super easy, very intuitive how everything worked. I contacted the physical therapist by email, who was going to set up the communication platform, and I added my information. It was absolutely no problem."* (Hospital dietitian 1).
>
> *"I used the digital communication platform once, but the patient let the invitation expire, and in the end, nothing was shared in it."* (Hospital physical therapist 1).

Referral within allied healthcare networks: Healthcare professionals reported that existing connections with primary care were already strong, which facilitated early communication and collaboration. The most substantial strengthening occurred in the relationships with geriatric rehabilitation centers, which expanded considerably due to the focused efforts made during the project. Building on these networks was highly valued, as easy access to contact information supported efficient coordination. Allied healthcare professionals emphasized the importance of maintaining these relationships and appreciated being able to refer patients to specialized colleagues. In more general hospital departments, however, the absence of a clearly defined network sometimes made it challenging to provide coordinated, network-based care.

> *"It has sparked some ideas for me and my colleagues to actually start talking with others about collaboration."* (Hospital physical therapist 4).
>
> *"We visited the geriatric rehabilitation centers in the region, we now have phone numbers and know each other, so hopefully this will grow into a real network."* (Hospital physical therapist 5).

Structured follow-up: Follow-up calls were mostly not completed because patients were readmitted early, difficult to reach, or due to privacy concerns and unclear role boundaries among healthcare professionals. Contacting colleagues in other settings was also challenging, with barriers including lack of dedicated time, high workload, unfamiliarity with making such calls, and the fact that these tasks were often forgotten when they were not embedded in routine workflows. Despite these challenges, professionals valued knowing how patients were doing at home and whether allied healthcare was continued after discharge.

> *"I tried to call a colleague after discharge, but no one ever answered."* (Hospital physical therapist 3).
>
> *"It (performing a follow-up call) is a considerable effort, and it raises the question of whose responsibility it actually is."* (Manager 3)

Theme 4 – Implementation strategies

Educational materials, such as posters, pocket cards, and newsletters served as helpful reminders that kept TULIP visible in daily practice. Healthcare professionals valued the central website where all information could be easily accessed, which strengthened their sense of involvement. Together, these materials supported awareness, consistency, and ongoing engagement.

"I feel you put a lot of effort into the newsletters and in sharing the TULIP story." (Hospital occupational therapist 2)

Audit and feedback were experienced as effective support. Weekly meetings were considered the strongest reminder, offering a concise and structured moment to review implementation progress. Email updates and the embedded researchers' accessibility further strengthened communication. Healthcare professionals reported feeling engaged and supported, noting that regular contact with the research team helped maintain awareness and motivation to implement TULIP.

"The best reminder is the weekly meeting to discuss implementation trends with the researcher." (Hospital physical therapist 4).

The appointment of key users was perceived as effective support. Assigning specific individuals per team clarified responsibilities and created clear points of contact. Participants reported that the role required a manageable time investment and helped them feel prepared and involved. Their feedback informed ongoing refinements, contributing to continued engagement with TULIP.

"We were truly guided every step of the way and could ask them anything at any time." (Hospital dietitian 2).

Maintenance

Among all allied healthcare professionals, the Net Promoter Score was –58, whereas it was -41 among those who reported any experience with TULIP. Only 3.7% of respondents were qualified as promoters (scores 9–10), whereas 44.4% were detractors (scores 0–6).

The data from the Net Promotor Score was supported by our interview data. Sustaining TULIP in practice over the long term or implementing it in other settings requires allied healthcare professionals to have openness to innovation and a positive attitude towards change, recognizing the added value of TULIP for patient care and their daily work. Healthcare professionals and managers emphasized that practical support is crucial, including support from management at institutional, regional, or national levels, training on new procedures, integrated ICT systems, and dedicated time within the work schedule to conduct tasks. They further noticed that a dedicated champion is also needed to embed TULIP into existing routines, monitor adherence, and

provide guidance or reminders, ensuring that it becomes a consistent and sustainable part of daily care.

> *"Without your efforts as an embedded researcher, the project would not be sustained."* (Manager 1).
>
> *"For implementation in other organizations, clear added value and organizational support are essential."* (Hospital physical therapist 4).

DISCUSSION

This process evaluation showed that, although allied healthcare professionals recognized the need to improve hospital-to-home transitions, implementation of TULIP was challenged by limited patient enrollment, intervention complexity, and variability in professional roles and responsibilities across settings. Patient inclusion was constrained by the complexity of patients' needs, including social factors, and by limited access to and use of primary care allied healthcare following discharge. This is particularly relevant, as patients with the greatest need for coordinated transitional care may also be the most difficult to include in such interventions (21). As a result, opportunities to develop routine practice and embed TULIP into daily workflows remained limited.

Adoption and implementation varied across settings and were strongly influenced by implementation support delivered by the embedded implementation researcher, reducing organizational ownership. In addition, not all professionals perceived TULIP-related activities, such as care coordination and follow-up, as part of their role, and these activities were interpreted and applied differently across care settings. The added value of the intervention was not consistently recognized, particularly in contexts where existing arrangements were already in place, highlighting the importance of alignment with existing care structures. These findings are consistent with previous research indicating that, while communication within disciplines is often in place, collaboration across care settings remains fragmented, limiting continuity of care after discharge (21, 22). Notably, co-creation did not automatically translate into ownership or sustained use in practice. In line with this, only small changes were observed in uniformity and counterproductive work behavior, with no significant improvements in interprofessional collaboration or overall work performance among allied healthcare professionals.

The findings further highlight a tension between bottom-up professional autonomy and the need for top-down organizational support. While flexibility

allowed local adaptation, the absence of clear organizational prioritization and integration into existing structures limited sustained engagement. Although initial implementation support facilitated uptake, reliance on a single implementation researcher may hinder long-term sustainability if responsibilities are not transferred to healthcare teams and embedded in routine practice. This may reflect limited implementation rather than limited intervention effectiveness, as patient reach, intervention delivery, and organizational embedding remained suboptimal.

This study has several strengths, including the use of a multi-methods design, the inclusion of perspectives from professionals, patients, and managers, and the application of the RE-AIM framework to structure the evaluation. However, the findings should be interpreted in light of several limitations. The evaluation reflects an early phase of implementation, with limited insight into long-term sustainability. Perspectives were predominantly hospital-based, and small sample sizes and missing data limited conclusions on effectiveness. In addition, broader system-level factors, such as financing and organizational structures, may have influenced implementation but were beyond the scope of this study. These findings indicate that sustained implementation of TULIP in its current form is unlikely without structural organizational support, integration into existing workflows, and clear alignment of roles and responsibilities.

Implications for practice

Sustainable implementation of transitional care interventions requires alignment of intervention components with patient and professional needs and existing care structures. Organizational support, clear role definitions, and integration into routine workflows appear essential to support continuity of care. The extent to which such interventions can be transferred or scaled to other settings is likely to depend on how well they align with local contexts, including available resources, organizational structures, and patient characteristics.

Implications for research

Future research should focus on co-creation and experiences of implementation and sustainment strategies with key stakeholders, including allied healthcare professionals, and on identifying which patient groups benefit most, or are appropriate for, such interventions. In addition, further work is needed to explore how system-level factors influence the feasibility and sustainability of transitional care pathways.

CONCLUSION

In conclusion, our multi-methods process evaluation highlighted several challenges that may limit the long-term sustainability of TULIP. Barriers were identified at the intervention level, including its complexity, limited perceived added value by professionals, and the small number of patients eligible for TULIP. In addition, patients assumed eligible, made limited use of allied healthcare in primary care after hospital discharge. Implementation barriers included reliance on the embedded researcher and limited organizational support. Together, these findings suggest that continuing TULIP in its current form is unlikely to be sustainable. Meaningful integration into routine practice will require co-creation with stakeholders, structural organizational support, and clear roles and responsibilities for all healthcare professionals involved.

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APPENDICES





Chapter 10

General discussion

GENERAL DISCUSSION

The aim of this thesis was to develop, implement, and evaluate a transmural allied healthcare care pathway (TULIP) for patients with complex care needs. Although continuity of care across healthcare settings is widely recognized as essential for this patient group, the role of allied healthcare professionals in supporting such continuity remains underexplored. As a result, there is limited empirical insight into how transmural allied healthcare pathways can be designed and successfully embedded in routine practice. Rather than conceptualizing TULIP as a fixed intervention, this work adopted an iterative and reflective approach to examine how transmural allied healthcare pathways can be designed, operationalized, and embedded in practice. Drawing on insights from healthcare professionals from different settings, as well as from patients, family members, healthcare managers, and overviews of existing literature, the thesis addresses key considerations underlying the organization of transmural allied healthcare. In doing so, it contributes to a deeper understanding of how such care pathways may be organized and could function, and what conditions are likely to influence their implementation in routine practice.

In this general discussion, first the main findings of this thesis are summarized. Subsequently, the key lessons learned from this research are discussed across three overarching themes: *interprofessional collaboration in a complex system context, professional roles in transitional care* and *the use of technology for communication in transitional care.* These themes address different aspects of the work, including methodological considerations. Finally, the implications for clinical practice and policy, and directions for future research are presented.

MAIN FINDINGS

This thesis is structured along three interrelated phases derived from the Intervention Mapping (IM) framework: needs assessment (steps 1–2), design (steps 3-4), and implementation and evaluation (steps 5-6) (1). Organizing the main findings according to these phases reflects the systematic logic through which the transmural allied healthcare pathway was developed, implemented, and evaluated.

Needs assessment (IM steps 1–2)

Patient involvement formed the basis for the development of TULIP, as demonstrated in **Chapter 2**. This qualitative study showed that patients experience hospital-to-home transitions as periods of insecurity marked by

unclear expectations, fragmented communication, and limited participation in decisions about follow-up care. Rather than merely confirming known coordination problems between professionals, patients highlighted how these discontinuities translate into feelings of unpreparedness. Their input extended beyond problem identification and directly informed the prioritization of intervention components, particularly regarding early communication, clarity of responsibilities, and explicit preparation for the home situation. This aligns with recent literature on participatory design and co-creation in healthcare, which suggests that early and meaningful patient involvement enhances the relevance, acceptability, and implementation potential of complex interventions (2). Within the needs assessment phase of Intervention Mapping, these findings ensured that the intervention logic was not exclusively grounded in professional or organizational assumptions (1, 3).

From the perspective of healthcare professionals unclarities in roles, responsibilities, and communication were identified as key actors of fragmented hospital-to-home transitions, as demonstrated in **Chapter 3**. They described variability in discharge practices, ad hoc identification of follow-up care needs, and limited alignment between hospital and community care. Rather than placing responsibility on individual professionals, the study showed that gaps in coordination and a lack of clear agreements between settings were key underlying problems. This aligns with recent implementation research showing that organizational structures, partnerships, infrastructure, and internal processes are important determinants of care coordination interventions, rather than individual behavior alone (4). Professionals emphasized the need for earlier needs identification, clarity about professional roles, and structured communication between healthcare settings. These findings further specified organizational and behavioral determinants requiring change and showed that patients' experiences of discontinuity are closely linked to insufficient collaboration and communication between allied healthcare professionals.

The challenges identified in the preceding qualitative studies reflected a broader pattern in transitional care, as demonstrated in **Chapter 4**. This systematic review showed that hospital-to-home transitions are consistently experienced as fragmented, poorly coordinated, and insufficiently person-centered. Patients and family members reported inadequate preparation for discharge, unclear communication, and limited involvement in decision-making, while healthcare professionals described time pressure, fragmented information systems, and poorly defined responsibilities across settings. Evidence suggests that clear coordination and shared decision-making in transitional care improve patients' preparation and continuity of care, indicating that discontinuities are related

to care organization rather than transitional care itself. This perspective aligns with contemporary guidance on complex interventions, which emphasizes that outcomes depend on the interaction between intervention components and the context in which they are implemented (5).

Beyond documenting the problem, evidence also indicates that structured multidisciplinary interventions can improve patient and system outcomes, as demonstrated in **Chapter 5**. This systematic review and meta-analysis showed favorable effects on outcomes such as hospital readmissions, healthcare utilization, and patient-centered measures. Interventions incorporating coordination, early needs identification, and interprofessional collaboration showed more consistent benefits. These findings provide empirical justification for developing our transmural allied healthcare pathway.

Design (IM steps 3-4)

Early and systematic identification of patients who may benefit from allied healthcare after discharge emerged as a critical prerequisite for improving transitional care, as demonstrated in **Chapter 6**. This study developed clinically applicable indicators, structured along ICF domains, to support healthcare professionals in the hospital in recognizing post-discharge allied healthcare needs in a more consistent and transparent manner (6). Identification of these needs was shown to be often implicit and inconsistent, relying heavily on individual clinical judgment rather than structured assessment. This observation aligns with broader evidence suggesting that structured assessment approaches and clinical decision-support tools can reduce unnecessary practice variation and enhance transparency and consistency in clinical decision-making (3, 7). By operationalizing key indicators for post-discharge allied healthcare needs, this chapter introduced decision-support that can be embedded in routine practice and clarified which clinical behaviors required greater standardization.

All knowledge generated in the preceding chapters was integrated into the development of TULIP, as described in **Chapter 7**. Using steps 1–4 of the Intervention Mapping framework (1), the study translated these insights into a structured and theory-informed intervention, consistent with recent applications of Intervention Mapping in complex healthcare intervention development (8-10). The resulting pathway consists of six components (figure 1): early identification of allied healthcare needs, appointing tasks and responsibilities, involving patients and families, a uniform and digital handover, referral within allied healthcare networks, and a telephone follow-up after

discharge. Rather than combining isolated elements, this chapter shows how experiential, organizational, and clinical insights were brought together into a coherent and practice-oriented intervention. It marks the transition from analysis to action by presenting a concrete pathway to improve transitional care.

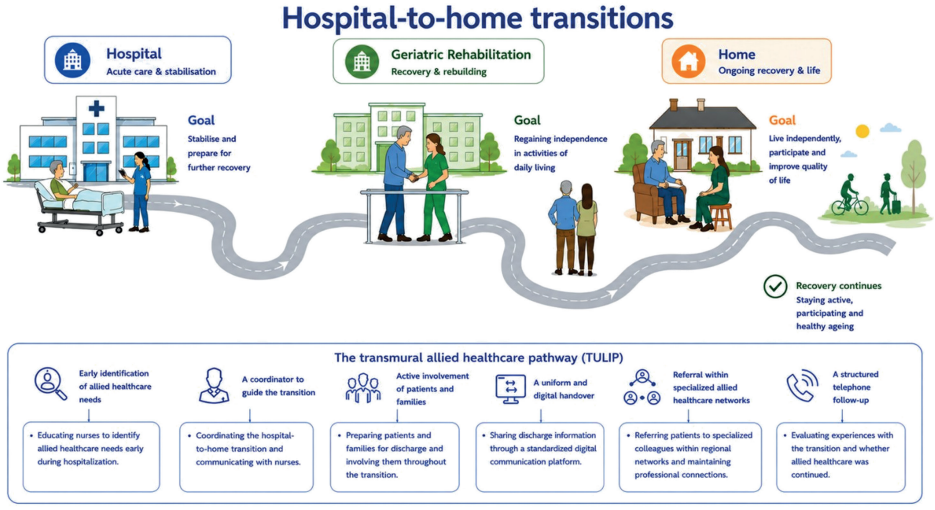


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Figure 1: Detailed overview of TULIP

Implementation and evaluation (IM steps 5-6)

Successful improvement of transitional care depends not only on intervention design but also on the conditions under which it is implemented, as demonstrated in **Chapter 8**. This aligns with implementation science frameworks that emphasize the role of contextual determinants at multiple levels, including leadership, workflow structures, and interprofessional relationships, in shaping whether interventions are adopted and sustained (11). Within this broader context, the concept of organizational readiness for change highlights that implementation further depends on both collective commitment and sufficient organizational capacity to adopt new practices (12). This systematic review identified key facilitators and barriers influencing implementation of multidisciplinary transitional care interventions across healthcare settings. Leadership support, clear role allocation, interprofessional trust, and alignment with existing workflows emerged as important enablers, whereas time constraints, fragmented information systems, and unclear cross-setting responsibilities were frequently reported barriers. These findings

clarified which barriers needed to be anticipated and which facilitating factors could be strengthened when planning implementation of our transmural allied healthcare pathway.

A RE-AIM guided process-evaluation provided insight into how our transmural allied healthcare pathway functioned in daily practice, as examined in **Chapter 9**. Using a multi-methods approach across hospital, geriatric rehabilitation, and primary care, the study explored feasibility, integration into routine practice, and professional experiences with implementation. Successful implementation required clear organizational support and was strongly dependent on an active implementation lead. The implementation required organizational guidance while maintaining professional autonomy. Acceptance of TULIP was limited due to restrained openness to change, not fully perceiving TULIP-related tasks as part of one's professional responsibility and recognizing the added value of structured coordination. Therefore, the pathway in its current form did not achieve sustainable integration within existing care structures. Similar challenges have been reported in multi-site hospital-to-home care pathways. Those pathways demonstrated initial feasibility but struggled to achieve sustained integration into routine practice due to competing clinical priorities, unclear ownership across care settings, and a lack of formal embedding within routine organizational processes (13, 14). Our findings indicate that, within TULIP, key conditions for sustainable implementation, as mentioned above, were not yet sufficiently established. This suggests that further refinement of specific components is necessary, as well as reconsideration of how and where the pathway can be embedded to achieve sustainable implementation.

In the following, we continue by discussing the key lessons learned from this research, including methodological considerations across three overarching themes.

Theme 1: Interprofessional collaboration in a complex system context

The development and implementation process of TULIP showed that delivering appropriate care in the right place extends beyond collaboration among allied healthcare professionals alone (15). The funding call for this thesis, titled "*Versterking paramedische samenwerking in de herstelzorg*", implicitly suggested that improving transmural collaboration could serve as a key lever for enhancing continuity of allied healthcare after hospitalization. The call also emphasized the potential role of technology solutions in supporting collaboration across healthcare settings. During the course of the project, it became evident that transmural collaboration represents only one element within a complex

healthcare system in which financing structures, organizational and regional decision-making structures, and policy priorities strongly influence the feasibility of sustainable change.

Several system-level conditions influenced both the implementation and the potential impact of TULIP. Fragmented financing structures between hospital and primary care hindered coordination across care settings. In addition, the absence of reimbursement for transmural coordination, combined with medically driven discharge processes, hampered the prioritization of allied healthcare transmural collaboration within existing organizational routines. The marginal integration of allied healthcare professionals within regional healthcare transformation plans developed under the Dutch Integrated Care Agreement (IZA) further diminished their influence on structural decision-making (16). Although these conditions lay beyond the direct scope of our project, they are critical for the long-term sustainability of TULIP.

To better understand the context in which transmural collaboration takes place, an extensive needs assessment was conducted as part of this thesis, incorporating the perspectives of professionals, managers, patients, and family members. This approach allowed TULIP to be grounded in perspectives from multiple stakeholders. The identified needs primarily concerned improvements in communication and coordination within existing healthcare structures. System-level conditions such as financing structures and governance arrangements did not emerge explicitly as domains for change. These conditions became more visible during the implementation process, where their influence on collaboration across care settings became apparent. Stakeholders in our needs assessment tend to focus on challenges that are directly experienced in daily practice and perceived as actionable within their professional context. As a result, broader structural conditions remained less visible, although they were already recognized; their importance for implementation and sustainability became more evident over time.

Our project focused on developing and implementing TULIP in routine practice rather than first testing effectiveness under controlled conditions. This implementation-oriented approach strengthened the potential for sustainable change, as TULIP was implemented directly in routine clinical practice. At the same time, more explicit action research oriented approach might have allowed for iterative refinement of the different components of TULIP during implementation, enabling continuous learning and adjustment while gradually optimizing the intervention (17). Importantly, multiple theoretical frameworks were used to guide its development, implementation, and evaluation (1, 11, 18,

19). These frameworks structured the design and the implementation process. However, they are less explicitly oriented toward analyzing dynamic interactions across system-level conditions. In public health, complex systems approaches show that health challenges are influenced by how complex health systems behave (20). From this perspective, financing mechanisms and organizational and regional decision-making structures are integral components of system dynamics rather than mere contextual conditions. While the frameworks applied in this thesis strengthened the development and coherence of the intervention, they provided limited insight into the broader system dynamics surrounding TULIP. This includes, for example, how reimbursement structures and regional collaboration arrangements influence implementation in practice.

Theme 2: Professional roles in transitional care

The roles and responsibilities of allied healthcare professionals are an important focus of this thesis. In the professional competency profiles of physiotherapists, occupational therapists, speech and language therapists, and dietitians, these professionals are no longer described solely as treatment providers (21-24). They are also positioned as communicators, collaborators, and innovators, reflecting a shift toward a broader and more collaborative professional identity.

In daily practice, however, this multidimensional role is not always fully realized. Structural factors such as high workload, production- and efficiency-driven incentives, and limited time for interprofessional consultation influence the extent to which collaboration and innovation can take place (25, 26). This suggests that professional role development is closely linked to the organizational conditions in which professionals work. At the same time, the shift toward this broader identity requires a professional culture in which collaboration, innovation, and shared responsibility for continuity of care are recognized as core aspects of the profession. When practice remains primarily focused on direct treatment delivery, these broader roles risk remaining underused.

The implementation of interventions such as TULIP illustrates that structural support is necessary, but that sustainable change also depends on the extent to which allied healthcare professionals see themselves as proactive collaborators and co-shapers of care processes. Approaches such as participatory action research may support this cultural shift, as they can facilitate collective reflection, strengthen professional autonomy, and enhance shared ownership in healthcare practice development (27).

However, role development does not take place in practice alone. Professional education also plays an important role in preparing practitioners for collaborative and integrated models of care. At present, structured training opportunities on interprofessional collaboration remain limited. Experiences within this project indicated a clear need for practical training and shared learning on this topic. Developing tailored educational modules for allied healthcare professionals and other care providers may therefore strengthen collaborative practice. In addition, exchange between healthcare institutions at regional or national levels may support shared learning and help professionals learn from existing initiatives.

Theme 3: The use of technology for communication in transitional care

Communication has been a recurring theme throughout this thesis and is consistently linked to continuity of care. Both coordination between professionals across settings and the involvement of patients and family members rely on timely and clear communication and information exchange. In this project, technology was used to connect professionals involved in the care of complex patients following hospital discharge and to facilitate communication with patients and their relatives. This enabled professionals to exchange information more easily and supported communication with patients and family members during the transition from hospital to home.

Communication between professionals across healthcare organizations took place within a fragmented digital communication landscape. While a single electronic health record (EHR) is often used within individual organizations, these systems are typically not interoperable across settings. In addition, many existing communication channels are monodisciplinary or setting-specific, creating a gap between the need for shared information and communication and the reality of fragmented digital infrastructures. A seemingly straightforward solution to this fragmentation would be a shared, interoperable EHR across organizations. In practice, such a system is not yet available, partly due to technical interoperability challenges and the complexity of data protection and privacy (28, 29). Local technology solutions therefore often emerge to support communication between professionals. Within this context, the use of a digital communication platform in our project offered a practical way to facilitate communication between professionals across organizational boundaries. It also provided insights into how such tools can support communication in transitional care and how they can be used within daily clinical practice.

The use of digital communication tools also raises questions about sustainability and structural embedding (30). Issues of ownership and governance are central: who is responsible for maintenance, financing, and further development during and after a research project? When access depends on a temporary research license, long-term continuity becomes uncertain. Furthermore, alignment with daily clinical workflows strongly influences uptake. Lack of integration with existing EHR systems may create additional barriers in an environment already characterized by multiple digital systems. Usability, accessibility on personal devices, clear information presentation, and adequate privacy safeguards are therefore essential for both professionals and patients. If more centralized or interoperable communication technologies become available in the future, the insights generated in this project regarding workflow integration, user needs, and cross-setting collaboration could inform further development in this domain.

Implications for policy, practice and further research

The findings of this thesis suggest that strengthening transitional care requires stronger structural support for interprofessional collaboration between healthcare professionals across care settings. Current economic, political and organizational structures provide limited incentives for collaborative transitional care (figure 2) (30).

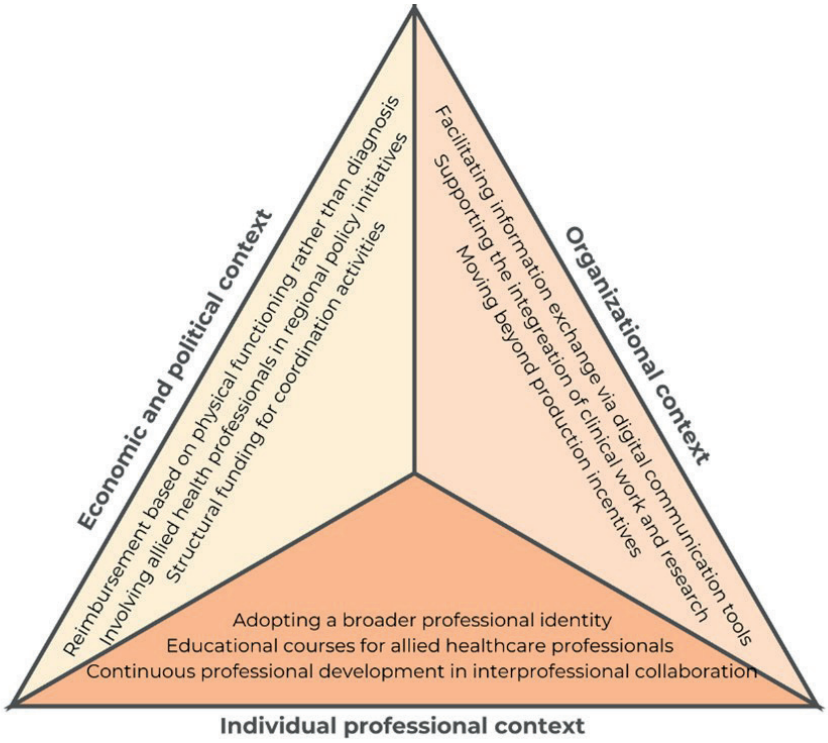


Figure 2: Implications in the economic & political, organizational and individual professional context (30)

Within the economic and political context, policy initiatives could support this collaboration by creating structural funding for coordination activities (such as time and infrastructures for interprofessional meetings). There is an opportunity for health insurers to move beyond diagnosis-driven reimbursement for allied healthcare after hospital discharge towards funding models that better reflect patients' functional needs during recovery. In addition, regional policy initiatives on transitional care would benefit from more explicitly incorporating the expertise of allied healthcare professionals, complementing existing medical and nursing perspectives with a focus on patients' daily functioning and recovery. This may also help prevent the development of fragmented initiatives and support more coordinated efforts to improve transitional care. This is important because many initiatives focus on a single discipline or part of the care process, while the challenges during hospital-to-home transitions extend across disciplines and care settings. Future research programs and funding calls could take these considerations

into account by supporting collaboration across care settings and disciplines, embedding implementation research within real-world policy and financing contexts, and moving beyond fragmented, single-setting study designs.

Within the organizational context, strengthening transitional care requires that healthcare professionals have sufficient time, skills and support to engage in transitional care activities such as interprofessional collaboration and serving as a coordinator for patients. These activities should be reimbursed as an integral part of professional practice rather than additional tasks alongside clinical work. At the same time, within the individual professional context, it is important that education for allied healthcare professionals explicitly addresses competencies related to transmural collaboration, coordination, and interprofessional communication. As developments in education take time to translate into clinical practice, sustained attention to these competencies within healthcare education remains important. Healthcare organizations (i.e. hospitals, rehabilitation centers) also play an important role by prioritizing these competencies within professional development and organizational agendas. Future research could explore how healthcare professionals can be enabled to participate in research and improvement initiatives such as TULIP, while maintaining their responsibilities in clinical practice. The use of embedded researchers may offer a way to support this.

When selecting and implementing digital communication tools in transitional care, it is important that these technologies offer a clear added value compared with existing communication routes. Tools that simply introduce an additional channel alongside existing systems may increase complexity rather than improve collaboration. Integration with the existing EHR, may therefore facilitate more consistent use in practice. Clear agreements about roles and responsibilities in the use of digital communication tools remain important, although these often become more apparent once technologies are well integrated into existing communication processes. Further research should explore how roles and responsibilities for coordination of interprofessional communication via digital platforms can be organized among healthcare professionals during hospital-to-home transitions. Finally, the role of digital communication in interactions with patients and families also warrants further attention, as they vary in their willingness and ability to engage with digital tools (due to multiple patient portals and the vulnerable period after discharge for patients and their families). Future research should examine whether patients and their families are able and willing to use digital communication tools during the hospital-to-home transition, whether such tools are suitable

for engaging them in communication, and how these technologies can best be used during this phase.

The intervention developed in this project was relatively complex, consisting of six components targeting different phases in transitional care and involving multiple settings. Although the literature suggests that transitional care interventions should remain simple to facilitate implementation (31), improving care across healthcare settings rarely lends itself to simple solutions. Focusing on only one or two components might have simplified implementation but would likely have had limited impact on the transition as a whole. At the same time, implementing multiple components may require prioritization and a more gradual, phased approach over time, rather than introducing all elements simultaneously (32). Moreover, changes in healthcare often take many years to become fully embedded. The four-year duration of this project should therefore be viewed as a starting point rather than an endpoint in the development of sustainable transitional care.

GENERAL CONCLUSION

Improving hospital-to-home transitions requires coordination and collaboration across healthcare settings, yet organizing such collaboration in clinical practice remains challenging. The findings of this thesis indicate that structuring early identification of care needs, involving patients and families, a digital and uniform handover, coordination between allied healthcare professionals and follow-up can help address fragmentation in transitional care. At the same time, the implementation of our transmural allied healthcare pathway showed that while problems in transitional care are often experienced at the level of clinical practice, the sustainability of solutions is strongly influenced by broader system conditions such as financing structures, organizational routines, and digital infrastructures. Improving transitional care therefore requires not only well-designed care pathways, but also greater alignment between such interventions and the healthcare systems in which they are implemented.

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Appendices

ENGLISH SUMMARY

Hospital-to-home transitions for patients with complex care needs are characterized by increasing complexity and fragmentation, highlighting the need for improved transitional care. Ageing populations and rising multimorbidity lead to more patients with multidimensional problems across physical, psychological, and social domains. As a result, (allied) healthcare needs to extend beyond hospital discharge and require coordinated support across settings. Current transitional care remains largely focused on nursing and medical aspects, while the role of allied healthcare professionals is insufficiently integrated. This contributes to gaps in continuity of allied healthcare, suboptimal functional recovery and patient outcomes after discharge. In addition, limited interprofessional collaboration further hinders effective care delivery across settings. These insights, presented in **Chapter 1,** provide the rationale and conceptual foundation for this thesis and position the development, implementation and evaluation of our transmural allied healthcare pathway (TULIP) as a key promising solution.

Designing transitional care interventions

Chapter 2 identifies patients' experiences, needs and priorities in the transition from hospital to home, with specific attention to the role of allied healthcare professionals. The findings of this qualitative study, based on 19 patient interviews, indicate that patients value timely involvement of allied healthcare professionals, clear communication, and continuity of support across care settings. At the same time, important gaps are identified. Patients report unclear expectations about allied healthcare after discharge, and insufficient coordination between hospital and primary care. In addition, patients experience difficulties with processing and recalling information, and experience misalignment between their preferences and the organization of care after discharge. These findings point to key barriers in current transitional care, particularly in communication, coordination, and patient-centeredness. This chapter therefore defines areas for improvement and provides the foundation for TULIP developed in this thesis, focusing on strengthening interprofessional collaboration, improving information provision, and delivering more tailored support.

In **Chapter 3**, continuity of care during hospital-to-home transitions is analyzed from the perspective of healthcare professionals in a qualitative study, including 53 healthcare professionals participating in focus groups and interviews. The results indicate that transitional care is not consistently

organized and often depends on local practices, resulting in unclear roles and responsibilities and fragmented communication between hospital and primary care. Discharge information is often incomplete or delayed, which complicates continuity of care after discharge. Interprofessional collaboration across settings remains largely informal and is not structurally embedded in daily work routine. In addition, patient and family involvement is not consistently integrated in transitional care. Together, these challenges hinder the delivery of coordinated, patient-centered care after discharge. At the same time, allied healthcare professionals emphasize the need for clearer agreements, structured communication, and better alignment across settings. These findings identify key barriers and define targets for improving continuity of care.

Experiences with hospital-to-home transitions are synthesized in a systematic review and meta-synthesis across patients, family members, and healthcare professionals in **Chapter 4**. This synthesis includes 53 qualitative studies and provides a comprehensive understanding of transitional care. The findings show that continuity of care, patient and family involvement, and tailored support are key elements of transitional care. However, these experiences also reveal persistent gaps, including fragmented communication, insufficient information exchange, and lack of alignment between care needs and provided support. Across participants, the need for personalized care and better coordination between hospital and primary care is consistently emphasized. These findings provide an integrated overview of what constitutes effective transitional care and where current practice falls short. These insights directly inform the development of TULIP.

In **Chapter 5**, the impact of multidisciplinary transitional care interventions on readmissions, mortality, quality of life, and physical functioning is evaluated in a systematic review and meta-analysis. In total, 49 trials including 25,566 patients were analyzed. The findings show that transitional care can reduce readmissions and mortality and improve quality of life and physical functioning. However, effects vary across studies and contexts, and not all outcomes show consistent improvement. Interventions differ in content, intensity, and level of coordination, which limits comparability and implementation in practice. More complex interventions show stronger effects but are often less feasible in routine care. These findings highlight the importance of selecting components that are both effective and feasible. They also underline the need to tailor transitional care to patient needs and care settings. This chapter adds evidence on which components of transitional care are effective and feasible and supports decision-making in the development of TULIP.

The findings from Chapters 2–5 are used as a needs assessment to identify gaps and priorities in hospital-to-home transitions and continuity of care. These chapters provide insight into patients' experiences, professionals' perspectives, and effective components of transitional care. Together, they form the empirical and theoretical basis for the next step, in which these insights are translated into the development of TULIP, described in Chapters 6 and 7.

In **Chapter 6**, indicators for allied healthcare needs after hospital discharge are identified in a qualitative study to support clinical decision-making during hospital-to-home transitions. The study involved 23 healthcare professionals participating in interviews and focus groups. Seventeen indicators are defined based on the International Classification of Functioning, Disability and Health. These indicators provide a more structured way to assess patients' needs and support continuity of care after discharge. In addition, the findings show that identifying these needs is influenced by timing, variation in practice, and unclear roles and collaboration between allied healthcare professionals. This leads to inconsistent application in transitional care. The identified indicators, combined with practical questions for clinical use, offer a first step towards more standardized and timely assessment of allied healthcare needs. These findings translate identified needs into practical tools and support the development of the first step of TULIP.

Our transmural allied healthcare pathway is developed to improve hospital-to-home transitions using a structured Intervention Mapping approach. TULIP builds on previously identified needs and targets key barriers in transitional care, including unclear roles, delayed identification of patients, fragmented communication, and limited patient and family involvement. As a result, TULIP consists of six components: early identification of allied healthcare needs, appointing a coordinator, active involvement of patients and families, a uniform and digital handover, referral within allied healthcare networks, and a telephone follow-up. These components aim to strengthen interprofessional collaboration among professionals and improve continuity of care across settings for patients with complex care needs. Using Intervention Mapping, evidence and stakeholder input are translated into a coherent and adaptable intervention. This is presented in **Chapter 7**, which describes the development of a theory-informed and practice-based allied healthcare pathway to improve transitional care for patients with complex care needs.

Implementing and evaluating transitional care interventions

Facilitators and barriers for implementing transitional care interventions are synthesized in a qualitative systematic review including 12 studies, using the Consolidated Framework for Implementation Research in **Chapter 8**. The findings show that successful implementation depends on factors at multiple levels, including the design of the intervention, the organization of care, and the professionals involved. Facilitators for implementation include perceived relevance of the intervention, alignment with existing workflows, and support from colleagues and organizations. However, implementation is hindered by limited time, shortage of professionals, misalignment in schedules, and insufficient financial resources. These factors occur across the pre- and post-discharge phases and affect continuity of care. The findings also show that complex interventions are more difficult to implement and require alignment with local context and workflows. This chapter contributes by identifying concrete determinants that guide the selection of implementation strategies for the implementation of TULIP.

The multi-methods process evaluation of TULIP examines its implementation and integration into routine care using the RE-AIM framework in **Chapter 9**. Multiple data collection methods were used, including pre–post data from two groups of 33 patients and 62 healthcare professionals, 20 interviews with healthcare professionals and managers, 7 interviews with patients, and field notes. These data provide insight into *Reach, Effectiveness, Adoption, Implementation,* and *Maintenance* of TULIP. TULIP reaches a broad group of healthcare professionals across settings, but patient enrollment is challenging because relatively few patients meet the eligibility criteria, often due to high complexity or reluctance to engage in rehabilitation after discharge. Small improvements in consistency of care delivery are observed among active TULIP users, indicating that TULIP supports more structured and aligned care and contributes to improved continuity of care across settings. Adoption varies across professionals and depends heavily on the implementation researcher, indicating limited organizational ownership and limited capacity among professionals to adopt new innovative projects. Implementation is hindered by intervention complexity, variation in task perceptions, and challenges in cross-setting coordination. Maintenance appears unlikely without structural embedding in routine care, highlighting that sustainable implementation requires alignment with workflows, clear roles and responsibilities, and stronger organizational commitment. In addition, only a limited number of patients engaged in allied healthcare services after discharge, suggesting

the need to better align transitional care interventions with the needs of this complex patient group.

This thesis deepens understanding of hospital-to-home transitions and provides a theory-informed and practice-based allied healthcare pathway, while highlighting the challenges of achieving sustainable improvements in continuity of care. In **Chapter 10**, the discussion summarizes the findings according to the steps of Intervention Mapping, including: needs assessment (steps 1–2), design (steps 3-4), and implementation and evaluation (steps 5-6). Next to that, three overarching themes are addressed: *interprofessional collaboration in a complex system context*, *professional roles in transitional care* and *the use of technology for communication in transitional care* including methodological considerations. We conclude by discussing the implications for research, practice, and policy.

NEDERLANDSE SAMENVATTING

De overgang van ziekenhuis naar huis voor patiënten met complexe zorgbehoeften wordt steeds ingewikkelder, wat de noodzaak benadrukt om de transmurale zorg (zorg over de muren van zorgorganisaties heen) te verbeteren. Door vergrijzing en een toename van multimorbiditeit (het gelijktijdig voorkomen van meerdere chronische aandoeningen) groeit het aantal patiënten met problemen op lichamelijk, psychisch en sociaal vlak. Hierdoor reiken zorgbehoeften verder dan het moment van ontslag en is gecoördineerde ondersteuning over verschillende zorgsettingen nodig. De huidige transmurale zorg richt zich echter voornamelijk op verpleegkundige en medische aspecten, terwijl de rol van paramedici (zoals fysiotherapeuten, diëtisten, logopedisten en ergotherapeuten) onvoldoende is geïntegreerd. Dit leidt tot hiaten in de continuïteit van paramedische zorg, suboptimaal herstel en minder goede uitkomsten na ontslag. Daarnaast belemmert beperkte interprofessionele samenwerking tussen professionals een goede afstemming van zorg tussen verschillende settingen. Deze inzichten, beschreven in **Hoofdstuk 1**, vormen de aanleiding en basis van dit proefschrift en positioneren de ontwikkeling, implementatie en evaluatie van een transmuraal paramedisch zorgpad (TULIP) als een kansrijke oplossing.

Ontwikkeling van transmurale zorg

In **Hoofdstuk 2** worden ervaringen, behoeften en wensen van patiënten in de overgang van ziekenhuis naar huis onderzocht, met specifieke aandacht voor de rol van paramedici hierin. Uit deze kwalitatieve studie, gebaseerd op 19 interviews met patiënten en naasten, blijkt dat patiënten waarde hechten aan tijdige betrokkenheid van paramedici, duidelijke communicatie en continue ondersteuning in de overgang van ziekenhuis naar huis. Tegelijkertijd worden belangrijke knelpunten zichtbaar. Patiënten ervaren onduidelijkheid over wat zij kunnen verwachten van paramedische zorg na ontslag en merken onvoldoende afstemming tussen ziekenhuis en eerstelijnszorg. Daarnaast hebben patiënten moeite met het verwerken en onthouden van informatie en ervaren zij een mismatch tussen hun voorkeuren en de organisatie van zorg na ontslag. Deze bevindingen wijzen op tekortkomingen in communicatie, coördinatie en patiëntgerichtheid binnen de huidige transmurale zorg. Dit hoofdstuk identificeert daarmee belangrijke verbeterpunten en vormt de basis voor de ontwikkeling van TULIP, gericht op betere signalering, samenwerking en informatievoorziening.

In **Hoofdstuk 3** wordt de continuïteit van zorg tijdens de overgang van ziekenhuis naar huis onderzocht vanuit het perspectief van o.a. paramedici, artsen en verpleegkundigen. In deze kwalitatieve studie namen 53 zorgverleners deel aan focusgroepen en interviews. De organisatie van transmurale paramedische zorg blijkt niet consistent en is vaak afhankelijk van lokale werkwijzen, wat leidt tot onduidelijke rollen en verantwoordelijkheden en gefragmenteerde communicatie tussen ziekenhuis en eerstelijnszorg. Ontslaginformatie is regelmatig onvolledig of vertraagd en interprofessionele samenwerking over settingen heen is grotendeels informeel en niet structureel ingebed in het dagelijks werk. Ook worden patiënten en naasten hierin niet goed betrokken. Deze knelpunten belemmeren het leveren van gecoördineerde en patiëntgerichte paramedische zorg na ontslag. Tegelijkertijd benadrukken paramedici de noodzaak van duidelijkere afspraken, gestructureerde communicatie en betere afstemming tussen settingen. Deze bevindingen identificeren belangrijke barrières en concrete aangrijpingspunten voor verbetering.

In **Hoofdstuk 4** worden ervaringen met de overgang van ziekenhuis naar huis samengebracht in een systematische review en meta-synthese van kwalitatieve studies onder patiënten, naasten en zorgverleners. In totaal zijn 53 kwalitatieve studies geïncludeerd. De resultaten laten zien dat continuïteit van zorg, betrokkenheid van patiënten en naasten, en maatwerk centrale elementen zijn van goede transmurale zorg. Tegelijkertijd worden aanhoudende knelpunten zichtbaar, zoals gefragmenteerde communicatie, gebrekkige informatieoverdracht en een beperkte afstemming tussen zorgbehoeften en geboden ondersteuning. Over alle studies heen wordt de noodzaak van persoonsgerichte zorg en betere coördinatie tussen ziekenhuis en eerstelijnszorg benadrukt. Dit hoofdstuk biedt een geïntegreerd overzicht van wat effectieve transmurale zorg kenmerkt en waar de huidige praktijk tekortschiet. Deze inzichten vormen directe input voor de ontwikkeling van TULIP en definiëren belangrijke verbeterdoelen voor continuïteit van zorg.

In **Hoofdstuk 5** wordt de effectiviteit van multidisciplinaire transmurale zorginterventies geëvalueerd in een systematische review en meta-analyse. In totaal zijn 49 studies met 25.566 patiënten meegenomen. De resultaten laten zien dat transmurale zorg kan leiden tot minder heropnames en mortaliteit en tot verbeteringen in kwaliteit van leven en lichamelijk functioneren. Tegelijkertijd variëren de effecten tussen studies en contexten, en zijn niet alle uitkomsten consistent positief. Interventies verschillen in inhoud, intensiteit en mate van coördinatie, wat vergelijkbaarheid en implementatie in de praktijk bemoeilijkt. Complexere interventies laten vaak sterkere effecten zien, maar zijn minder

goed uitvoerbaar en implementeerbaar in de dagelijkse zorg. Deze bevindingen benadrukken het belang van het selecteren van interventiecomponenten die zowel effectief als haalbaar zijn en benadrukken de noodzaak van afstemming op patiëntbehoeften en zorgcontext. Dit hoofdstuk levert daarmee belangrijke inzichten voor de ontwikkeling van TULIP.

De bevindingen uit Hoofdstuk 2 tot en met 5 worden gebruikt om belangrijke knelpunten en prioriteiten in de overgang van ziekenhuis naar huis te identificeren. Deze hoofdstukken bieden inzicht in ervaringen van patiënten, perspectieven van zorgverleners en effectieve componenten van transmurale paramedische zorg. Samen vormen zij de praktijkgerichte en theoretische basis voor de volgende stap, waarin deze inzichten worden vertaald naar de ontwikkeling van TULIP, beschreven in Hoofdstuk 6 en 7.

In **Hoofdstuk 6** worden indicatoren ontwikkeld om paramedische zorgbehoeften na ontslag uit het ziekenhuis te bepalen, ter ondersteuning van klinische besluitvorming tijdens de overgang van ziekenhuis naar huis. De studie omvatte 23 zorgverleners die deelnamen aan interviews en focusgroepen. Op basis van het International Classification of Functioning, Disability and Health raamwerk zijn 17 indicatoren gedefinieerd. Deze indicatoren bieden een meer gestructureerde manier om paramedische zorgbehoeften in kaart te brengen en dragen bij aan continuïteit van zorg na ontslag. Tegelijkertijd blijkt dat het identificeren van deze behoeften wordt beïnvloed door timing, variatie in werkwijzen en onduidelijkheid over rollen en samenwerking tussen paramedici, wat leidt tot inconsistent gebruik. De indicatoren, aangevuld met praktische vragen voor gebruik in de klinische praktijk, vormen een eerste stap richting meer gestandaardiseerde en tijdige signalering. Deze bevindingen vertalen de geïdentificeerde behoeften naar concrete handvatten en ondersteunen de verdere ontwikkeling van TULIP.

TULIP is ontwikkeld om de overgang van ziekenhuis naar huis te verbeteren met behulp van het Intervention Mapping-raamwerk. Daarbij is voortgebouwd op eerder geïdentificeerde behoeften en gericht op belangrijke knelpunten, zoals onduidelijke rollen, late identificatie van patiënten, gefragmenteerde communicatie en beperkte betrokkenheid van patiënten en naasten. TULIP bestaat uit zes componenten: vroege signalering van paramedische zorgbehoeften, het aanstellen van een paramedisch coördinator, actieve betrokkenheid van patiënten en naasten, een uniforme en digitale overdracht, verwijzing binnen paramedische netwerken en een telefonische follow-up. Deze componenten zijn gericht op het versterken van interprofessionele samenwerking en het verbeteren van continuïteit van zorg voor patiënten met

complexe paramedische zorgbehoeften. Door middel van het Intervention Mapping raamwerk worden wetenschappelijke bewijs en input van stakeholders vertaald naar een logische en aanpasbare interventie. De ontwikkeling van TULIP wordt beschreven in **Hoofdstuk 7**.

Implementatie en evaluatie van transmurale zorg

In **Hoofdstuk 8** worden bevorderende en belemmerende factoren voor de implementatie van een transmuraal zorgpad in kaart gebracht in een kwalitatieve systematische review, waarin 12 studies zijn geïncludeerd. Hiervoor wordt gebruikgemaakt van het Consolidated Framework for Implementation Research. De resultaten laten zien dat succesvolle implementatie afhankelijk is van factoren op meerdere niveaus, waaronder de interventie zelf, de organisatie van zorg en de betrokken professionals. Belangrijke bevorderende factoren zijn de ervaren relevantie van de interventie, aansluiting bij bestaande werkprocessen en ondersteuning vanuit collega's en organisaties. Belemmeringen zijn onder andere tijdsgebrek, personeelstekorten, afstemmingsproblemen in roosters en beperkte financiële middelen. Deze factoren spelen een rol zowel vóór als na ontslag en beïnvloeden de continuïteit van zorg. Daarnaast blijkt dat complexere interventies moeilijker te implementeren zijn en beter moeten aansluiten op de lokale context en werkprocessen. Dit hoofdstuk geeft een concrete richting aan de keuze van implementatiestrategieën voor TULIP.

In **Hoofdstuk 9** wordt de implementatie en integratie van TULIP in de dagelijkse praktijk geëvalueerd in een procesevaluatie, gebaseerd op het RE-AIM raamwerk wat staat voor *Reach, Effectiveness, Adoption, Implementation* en *Maintenance*. Hierbij zijn verschillende dataverzamelingsmethoden gebruikt, waaronder data uit een voor-na meting van twee groepen van 33 patiënten en 62 zorgverleners, 20 interviews met zorgverleners en managers, 7 interviews met patiënten en gespreksverslagen. TULIP bereikt een brede groep zorgverleners in verschillende settingen, maar inclusie van patiënten blijkt uitdagend doordat weinig patiënten voldoen aan de inclusiecriteria, vaak vanwege hoge complexiteit of terughoudendheid ten aanzien van paramedische zorg na ontslag. Kleine verbeteringen in de consistentie van geleverde zorg worden gezien bij actieve gebruikers van TULIP, wat wijst op een meer gestructureerde overgang van ziekenhuis naar huis. De adoptie varieert tussen zorgverleners en is sterk afhankelijk van de implementatieonderzoeker, wat duidt op beperkte organisatorische ondersteuning en inbedding en beperkte capaciteit om de nieuwe werkwijze te gebruiken. Implementatie wordt verder belemmerd door de complexiteit van het zorgpad, verschillen in taakopvattingen en uitdagingen

in samenwerking tussen settingen. Structurele borging in de dagelijkse praktijk lijkt daardoor onwaarschijnlijk zonder aanpassingen. Duurzame implementatie vraagt om betere aansluiting bij werkprocessen, duidelijke rolverdeling en sterkere organisatorische betrokkenheid. Daarnaast blijkt dat slechts een beperkt aantal patiënten gebruikmaakt van paramedische nazorg in de eerstelijn, wat wijst op de noodzaak om transmurale zorg beter af te stemmen op de behoeften van deze complexe patiëntengroep.

Dit proefschrift geeft uitgebreid inzicht in de overgang van ziekenhuis naar huis, presenteert een theoretisch onderbouwd en praktijkgericht zorgpad en laat tegelijkertijd de uitdagingen rondom duurzame implementatie zien. In **Hoofdstuk 10** worden de belangrijkste bevindingen besproken aan de hand van de stappen van Intervention Mapping: behoeften analyse (stappen 1–2), ontwikkeling (stappen 3–4) en implementatie en evaluatie (stappen 5–6). Daarnaast worden drie overkoepelende thema's uitgewerkt: *interprofessionele samenwerking in een complexe systeemcontext*, *professionele rollen binnen transmurale zorg* en *het gebruik van technologie voor communicatie* samen met methodologische overwegingen. Tot slot worden aanbevelingen voor onderzoek, praktijk en beleid besproken.

AUTHORS CONTRIBUTIONS

Chapter 2

Engaging patients in designing a transmural allied health pathway: A qualitative exploration of hospital-to-home transitions

Conceptualization:	J.G., R.C., M.M., S.W., J.D., M.L., E.G., R.O., M.S.
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Chapter 3

Continuity and Coordination of Care During Hospital-To-Home Transitions: Healthcare Professionals' Perspectives

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Chapter 4

Experiences with hospital-to-home transitions: perspectives from patients, family members and healthcare professionals. A systematic review and meta-synthesis of qualitative studies

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Chapter 5

The Impact of Multidisciplinary Transitional Care Interventions for Complex Care Needs: A Systematic Review and Meta-Analysis

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Chapter 6

Indicators for allied healthcare needs after hospital discharge – a qualitative study

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Chapter 7

Development of the transmural allied healthcare pathway (TULIP) – an intervention mapping approach

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Chapter 8

Facilitators, barriers, and guidance to successful implementation of multidisciplinary transitional care interventions: A qualitative systematic review using the consolidated framework for implementation research

Conceptualization:	R.C., J.G., J.D., S.W., R.O., M.S., E.G., M.M., M.L.
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Chapter 9

A transmural allied healthcare pathway (TULIP) – A multi-methods process evaluation

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ABOUT THE AUTHOR



Juul van Grootel was born on 29 November 1993 in Geldrop, the Netherlands. After graduating from high school at S.G. Were Di in Valkenswaard, she enrolled in the accelerated three-year program of the Bachelor of Physiotherapy at HU University of Applied Sciences Utrecht. During her study, Juul served on the board of the student association ´Paramedus´. She graduated in 2015 at the age of 21 and subsequently began working as a physiotherapist in a multidisciplinary primary care health center in Leidsche Rijn.

In this role, she gained experience as a physiotherapist and developed an interest in scientific research. After two years, in 2017, she started with the pre-master's program in Clinical Health Sciences at Utrecht University, while also working as a hospital-based physiotherapist at the UMC Utrecht on the pulmonology ward and in the Intensive Care Unit. During her clinical work she focused on patients with lung transplantation. In 2018, Juul started the master's program in Health Sciences, specializing in Physiotherapy Science, at Utrecht University, which she successfully completed in 2020.

Following completion of her master's degree, Juul worked for three years as a lecturer in Physiotherapy at HU University of Applied Sciences Utrecht, contributing to both bachelor's and master's level education. In addition, she held a position as a lecturer-researcher on collaborative research projects between UMC Utrecht and HU University of Applied Sciences Utrecht, including the Better Prepared and GOAL projects.

After several years of combining multiple roles (hospital-based physiotherapist, lecturer in physiotherapy, and researcher) Juul decided to focus on research. In 2023 she started with a PhD position within the TULIP project at the department of Rehabilitation Medicine at Amsterdam UMC. This project focuses on improving the transition from hospital to home for patients with allied healthcare needs. Juul draws on her background as a hospital-based physiotherapist and her expertise in implementation science to optimize this transition.

In the coming years, Juul aims to continue contributing to the implementation of complex healthcare innovations and care pathways within patient care.

Juul lives together with Sam Welten and their dog, Flos in Alphen-Chaam.

PORTFOLIO

General Courses	Year	ECTS
Basic Teaching Qualification	2022	5.0
E-BROK (“Basiscursus Regelgeving Klinisch Onderzoek”)	2022	1.5
Project Management	2023	1.0
Update E-BROK	2024	0.5

Specific Courses	Year	ECTS
Qualitative Health Research	2023	2.0
Intervention Mapping Maastricht University	2024	2.0
Statistics – Computing in R	2024	1.0
Peer-to-peer Group Coaching	2024	2.0
Implementation and De-implementation IQ Healthcare Radboud	2026	2.0
Grant writing	2026	0.5

Workshops	Year	ECTS
Systematic Review Searching	2023	0.5
From Research to Implementation	2023	0.5
Abstract Writing	2024	0.5
Planning Your PhD	2024	0.5
Science Communication	2024	0.5
Designing a Poster	2024	0.5
Planning a Process Evaluation	2025	0.5
Planning Implementation of Complex Interventions	2025	0.5
Use of AI in healthcare research	2025	0.5

Oral Presentations	Congress and location	Year	ECTS
Experiences with hospital-to-home transitions	REACH Congress, Amsterdam	2023	0.5
Project presentation TULIP	Dutch Association for Hospital Physiotherapy Congress, Utrecht	2023	0.5
Engaging patients in designing a transmural allied healthcare pathway	World Congress Physiotherapy, Tokyo	2025	0.5
Lessons learned from the implementation of TULIP	ZonMw Seminar Implementation	2026	0.5
Process evaluation of TULIP	International Congress of Geriatrics and Gerontology, Amsterdam	2026	0.5
TULIP: Lessons learned of a 4-year transmural allied healthcare project	Dutch Association for Hospital Physiotherapy Congress, Amsterdam	2026	0.5
Workshop and presentation on interprofessional collaboration	Scientific College of Physical Therapy (WCF), Utrecht	2026	0.5

Poster Presentations	Location	Year	ECTS
Engaging patients in designing a transmural allied healthcare pathway	Amsterdam Movement Sciences Congress, Amsterdam	2024	0.5
Experiences with hospital-to-home transitions	Amsterdam Movement Sciences Congress, Amsterdam	2025	0.5
Experiences with hospital-to-home transitions	World Congress Physiotherapy (WCPT), Tokyo, Japan	2025	0.5
Process evaluation of TULIP	International Society of Behavioral Nutrition and Physical Activity (ISBNPA) conference, Cádiz, Spain	2026	0.5

Mentoring students	Year
Niels van der Hoorn. Improving the transition from hospital to home for patients with complex care needs: a triage instrument. *Bachelor of Medicine, University of Amsterdam*	2023
Iris Bosman. Developing a screening tool to identify the need for allied healthcare after hospital discharge: a qualitative exploration of the essential components. *Master Clinical Health Sciences, Utrecht University*	2024
Maartje van Bemmel & Kim Oostrom. Physical functioning and quality of life in patients after discharge from the hospital. *Bachelor Physical Therapy, University of Applied Sciences Amsterdam*	2024
Olaf van Breemen. Experienced Collaboration Among Allied Healthcare Professionals in the Management of Patients with Complex Care Needs after Hospitalization – A mixed method study. *Master Clinical Health Sciences, Utrecht University*	2025
Elijah Erven. The use of allied healthcare after a complex hospital admission. *Master of Medicine, University of Amsterdam*	2026
Lorenzo du Crocq. Experienced interprofessional collaboration among allied healthcare professionals from different settings. *Master Geriatric Physical Therapy, University of applied sciences Utrecht*	2026

Board and committee positions	Period	ECTS
Member, Amsterdam Movement Sciences PhD Committee	2023–2026	5.0

A

LIST OF PUBLICATIONS

Publications as part of this thesis

- **van Grootel JWM**, Collet RJ, Major ME, Wiertsema S, van Dongen JM, van der Leeden M, Geleijn E, Ostelo R, van der Schaaf M. Engaging patients in designing a transmural allied health pathway: A qualitative exploration of hospital-to-home transitions. Health Expect. 2024 Apr;27(2):e13996. doi: 10.1111/hex.13996. PMID: 38491738; PMCID: PMC10943249.
- **van Grootel JWM**, Collet RJ, van Dongen JM, van der Leeden M, Geleijn E, Ostelo R, van der Schaaf M, Wiertsema S, Major ME. Experiences with hospital-to-home transitions: perspectives from patients, family members and healthcare professionals. A systematic review and meta-synthesis of qualitative studies. Disabil Rehabil. 2025 Apr;47(7):1644-1658. doi: 10.1080/09638288.2024.2384624. Epub 2024 Aug 5. PMID: 39101687; PMCID: PMC11974919.
- Collet RJ*, **van Grootel JWM***, van der Leeden M, van der Schaaf M, van Dongen JM, Wiertsema S, Geleijn E, Major ME, Ostelo R. Facilitators, barriers, and guidance to successful implementation of multidisciplinary transitional care interventions: A qualitative systematic review using the consolidated framework for implementation research. Int J Nurs Stud Adv. 2024 Nov 29;8:100269. doi: 10.1016/j.ijnsa.2024.100269. PMID: 39691681; PMCID: PMC11647461.
- Collet RJ, **van Grootel JWM**, van Dongen JM, Wiertsema S, Ostelo R, van der Schaaf M, Lazzari E, Geleijn E, Major ME, van der Leeden M. The Impact of Multidisciplinary Transitional Care Interventions for Complex Care Needs: A Systematic Review and Meta-Analysis. Gerontologist. 2025 May 10;65(6):gnaf088. doi: 10.1093/geront/gnaf088. PMID: 40040533; PMCID: PMC12086065.
- **van Grootel JWM**, Collet RJ, van Dongen JM, van der Leeden M, Geleijn E, Ostelo R, van der Schaaf M, Major ME, Wiertsema S. Continuity and Coordination of Care During Hospital-To-Home Transitions: Healthcare Professionals' Perspectives. J Clin Nurs. 2025 Mar 26. doi: 10.1111/jocn.17758. Epub ahead of print. PMID: 40143559.
- **van Grootel JWM***, Bosman I*, Collet RJ, van Dongen JM, van der Leeden M, Geleijn E, Ostelo R, van der Schaaf M, Wiertsema S. Indicators for allied healthcare needs after hospital discharge - a qualitative study. Geriatr Nurs. 2025 Nov-Dec;66(Pt A):103585. doi: 10.1016/j.gerinurse.2025.103585. Epub 2025 Aug 20. PMID: 40840155.
- **van Grootel JWM**, Collet RJ, van Dongen JM, van der Leeden M, Geleijn E, Ostelo R, van der Schaaf, Wiertsema S. Development of the transmural allied healthcare pathway (TULIP) – an intervention mapping approach, 10 February 2026, PREPRINT (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-8133659/v1] (under review)

- **van Grootel JWM,** S. Wiertsema, J.M. van Dongen, F. van Nassau, E. Geleijn, R.J. Collet, A.M. van Bemmel, M. van der Schaaf, R. Ostelo, M. van der Leeden A transmural allied healthcare pathway (TULIP) – a multi methods process evaluation (JBI Evid Implement. 2026 Aug 25. doi: 10.1097/XEB.0000000000000648. Epub ahead of print. PMID: 42644762.)

Other publications

- **van Grootel JWM**, Bor P, Netjes JA, Veenhof C, Valkenet K. Improving physical activity in hospitalized patients: The preliminary effectiveness of a goal-directed movement intervention. Clin Rehabil. 2023 Nov;37(11):1501-1509. doi: 10.1177/02692155231189607. Epub 2023 Jul 24. PMID: 37487188; PMCID: PMC10492426.
- **van Grootel JWM**, Bor P, Veenhof C, Valkenet K. Development of a goal-directed movement intervention (GOAL) using a movement sensor for hospitalized patients: An intervention mapping approach. Clin Rehabil. 2024 Feb;38(2):251-262. doi: 10.1177/02692155231198173. Epub 2023 Aug 30. PMID: 37644843; PMCID: PMC10725127.
- Collet R, Groenewoud C, Ostelo R, **van Grootel JWM**, van der Leeden M, van der Schaaf M, Wiertsema S, Geleijn E, Major M, Bosmans J, van Dongen J. Cost-effectiveness of multidisciplinary transitional care interventions: A systematic review and meta-analysis. Int J Nurs Stud. 2025 Aug;168:105103. doi: 10.1016/j.ijnurstu.2025.105103. Epub 2025 May 3. PMID: 40394777.
- van der Velde M, van der Leeden M, Geleijn E, Veenhof C, Valkenet K; **Better Prepared Group.** The Effectiveness of the Be Prepared mHealth App on Recovery of Physical Functioning After Major Elective Surgery: Multicenter Randomized Controlled Trial. JMIR Mhealth Uhealth. 2025 May 30;13:e58703. doi: 10.2196/58703. PMID: 40446217; PMCID: PMC12143736.
- S. Hendriks, M. Stuiver, E. Geleijn, K. Valkenet, M. van der Velde**, JWM van Grootel**, J. van der Stap, C. Dickhoff, M. van der Leeden. One-year follow-up of physical functioning and symptoms in patients after lung cancer surgery: a bi-center prospective cohort study (under review).
- **JWM van Grootel,** Collet RJ, Major ME, Wiertsema S, van Dongen JM, van der Leeden M, Geleijn E, Ostelo R, van der Schaaf M., "Response to LTE "Bridging the Gap Between Patient Experience and System-Level Review: A Call for Discipline-Specific Communication in Hospital-to-Home Transitions," Health Expectations29 (2026): e70744. https://doi.org/10.1111/hex.70744.

DANKWOORD

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Amsterdam Movement Sciences

VU Vrije Universiteit Amsterdam

Amsterdam UMC

Amsterdam Movement Sciences conducts scientific research to optimize physical performance in health and disease based on a fundamental understanding of human movement in order to contribute to the fulfillment of a meaningful life.