Geriatric rehabilitation

Development, implementation and evaluation of an integrated care pathway for patients with complex health problems

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Voor mijn ouders, Mien en Gerard

CONTENTS

1

GENERAL INTRODUCTION

General introduction

Mrs Koning is an 82 year old widow who lives at home independently. She is regularly short-breathed due to congestive heart failure and in combination with her arthritis she needs assistance with her personal care. Therefore, every morning and every evening a community nurse helps her with her compression stockings, washing and dressing. Her three children and seven grandchildren live in the neighbourhood and visit Mrs. Koning every week. Three days per week, Mrs. Koning strolls to the community centre with her walker to play cards with her friends.
Recently, Mrs. Koning suffered from pneumonia and an ambulance brought her to the hospital. Although she slowly recovered during her hospital stay, Mrs Koning also noticed that going to the bathroom alone or getting out of bed independently was rather burdensome. She was very anxious that she needed to go to a nursing home. When she expressed her worries and her desire to return home to the discharge nurse, the nurse assured her that she could temporarily go to a geriatric rehabilitation facility. There, professionals would train her to gain mobility and physical fitness to safely return home. Mrs Koning was highly relieved and three days later, her daughter brought her to the facility. After four weeks of hard work, Mrs Koning reached her rehabilitation goals: transfer in and out of her bed, independently going to the toilet with her walker and walking small distances. The nurses from the geriatric rehabilitation facility contacted her home care organization to restart homecare the evening Mrs Koning returned home. The physiotherapists of the geriatric rehabilitation facility referred her to a physiotherapist in her neighbourhood because although her rehabilitation goals were reached, there was still room for improvement. Five weeks after returning home Mrs Koning had made such progress with her physiotherapist that she was able to take her walker and stroll to the community centre to play cards again.

Mrs Koning her story is a rather successful one and describes the desired situation more than the current care delivery. Older patients with complex health problems who transfer between settings (hospital, geriatric rehabilitation facility and primary care) often face various challenges regarding continuity and coordination of care. These challenges might result in negative effects with respect to the rehabilitation outcome, such as insufficient functional improvement, early hospital readmissions and permanent placement in a nursing home.[1-3] To enhance coordination and continuity of care and to improve the quality of geriatric rehabilitation, an integrated care pathway for geriatric rehabilitation was developed in the Maastricht area, which is situated in the south of the Netherlands. This dissertation describes the development, implementation and evaluation of this integrated care pathway. This first chapter introduces the topic of this dissertation, the aims and its outline.

Ageing and multimorbidity

Mrs Koning belongs to the 17.7% of the total Dutch population who was 65 years or older in 2015 and to the 4.3% who was 80 years or older.[4] A combination of lower birth rate and longer life expectancy, partly due to medical progress, causes the population in developed countries to age.[5] It is expected that in 2035, 25.4% of the Dutch population will be 65 years or older and 8.0% will be 80 years or older.[6] This ageing trend is visible in all EU member states.[7]

Although life expectancy has risen and is expected to continue to rise in the future, higher age is also associated with the prevalence of chronic conditions and disorders such as cancer, stroke, fractured hips and dementia.[5, 7] The healthy life expectancy (the number of years people are expected to live in good health) does not seem to keep pace with the increased life expectancy.[8] This is also the case for Mrs Koning: she suffers from congestive heart failure and arthritis and this classifies her as multimorbid. Multimorbidity is defined as the presence of two or more chronic medical conditions in an individual and is common among older adults; prevalence numbers among patients aged 65 years or older range between 62% – 81.5%.[9] Multimorbidity is associated with poor functional status, increased risk of disabilities and also a high risk of emergency hospital admissions.[7, 9, 10]

Functional decline during hospitalization

An acute event (pneumonia) resulted in an emergency hospital admission for Mrs Koning. People admitted to the hospital with an acute illness often experience subsequent inactivity, immobility and bed rest. Combined with the acute event could this, in particular among multimorbid older adults, result in harmful effects such as muscle weakness, sarcopenia, contractures, atrophy and deconditioning. As a consequence, hospitalization often leads to functional decline and deterioration in self-care abilities.[11] In a study of Covinsky and colleagues, 35% of all patients aged 65 or older had worse functioning in activities of daily living (ADL) than prior to hospital admission and this number even exceeded 50% in patients aged 85 years and older.[12] Independent functioning appears to be a crucial determinant of successful ageing from a patient's perspective.[13, 14] Furthermore, loss of dependency in ADL activities often results in prolonged hospital stay or early institutionalization in a long-term care setting.[15] Besides the harmful effects of institutionalization on patients, such as loss of social contacts and a decreasing quality of life[16], it places a high financial burden on society.

As enabling older patients to remain in their own homes, also called ageing in place[17], is an important policy objective in many countries,[7,18] it is important to avoid a lengthy hospital stay and institutionalization. However, it is not possible for all community-

dwelling older patients to directly go home after a period of hospital stay. Therefore, these patients can be temporarily admitted to a post-acute geriatric rehabilitation facility to restore functioning, prevent disability and prevent admission to long-term care facilities.[11]

Geriatric rehabilitation

Geriatric rehabilitation takes place in Post-Acute Care (PAC) facilities[19, 20] and aims to restore quality of life and independent functioning in terms of mobility and activities of daily living.[21] A systematic review of Bachmann and colleagues showed that geriatric rehabilitation has the potential to improve functional status, decrease permanent admissions to nursing homes and decrease mortality.[22] The most commonly used definition of geriatric rehabilitation was created by the Boston Working Group in 1997 and comprises *"evaluative, diagnostic, and therapeutic interventions whose purpose is to restore functional ability or enhance residual functional capability in elderly people with disabling impairments".*[23] As geriatric rehabilitation addresses the special aspects of ageing, it is different from specialized medical rehabilitation for younger patients.[22] Patients in geriatric rehabilitation often experience pre-existing physical limitations, a higher number of comorbidities, cognitive impairments and polypharmacy. [22, 24, 25] Patients in geriatric rehabilitation thus have less exercise tolerance and have fewer abilities to learn new skills as opposed to younger patients. As a consequence, the treatment intensity of the rehabilitation program is lower. In the USA, patients can receive inpatient geriatric rehabilitation in inpatient rehabilitation facilities (IRFs), skilled nursing facilities (SNFs) and long-term care hospitals (LCTHs).[26] The difference between these settings is mainly the therapy intensity and degree of medical support.[20] Patients who are admitted to an IRF should be able to tolerate 3 hours of therapy for at least 5 days per week[27] whereas in SNFs, there is no minimum of hours of therapy required. Therefore, frailer patients usually go to SNFs as the therapy intensity is usually lower and patients can stay for a longer period of time.[20] Rehabilitation in LTCHs is usually focused on the very medically complex and unstable patients in need of intensive medical care. Services provided are mainly focused on respiratory therapy, head trauma treatment and pain management.[28]

Geriatric rehabilitation in the Netherlands

In the Netherlands, geriatric rehabilitation facilities are usually embedded in nursing homes and in these facilities, the elderly care physician leads the multidisciplinary team. Elderly care medicine (formerly known as nursing home medicine) is an official regis-

tered medical specialization in the Netherlands[29] and elderly care physicians are specialized in the care of frail and disabled older people with chronic, complex diseases. They have wide knowledge of age-related diseases and multimorbidity and, opposed to hospital geriatricians, they primarily work in nursing homes and geriatric rehabilitation facilities.[30] In 2014, over 47.000 patients were admitted to a geriatric rehabilitation facility in the Netherlands.[31] Patients can only be admitted to a geriatric rehabilitation facility if they need multidisciplinary care and if it is expected that the patient is able to return home after discharge. The definition of geriatric rehabilitation used in the Netherlands is "*integrated multidisciplinary care focused on projected recovery of functional ability and participation among frail elderly after an acute event or functional decline.*"[32] Geriatric rehabilitation in the Netherlands can largely be compared to rehabilitation in SNFs.

Patients in geriatric rehabilitation in the Netherlands have been categorized into four main categories: 1) older patients with stroke, 2) older trauma orthopaedic patients, 3) older elective orthopaedic patients (joint replacements) and 4) other patients. This dissertation focuses on this last group. Patients in this 'other patients' group are often described as patients with complex (geriatric) health problems. They are usually multimorbid and suffer from various chronic conditions such as cardiac problems (i.e. congestive heart failure), neurological problems (i.e. Parkinson's disease), gastro-internal or oncological problems or problems with the respiratory system (i.e. COPD). An acute disruption of their chronic disease and functional status often leads to an acute deterioration in daily function, resulting in hospital readmissions and the need for geriatric rehabilitation. The distribution of patients in geriatric rehabilitation across these four main categories in 2014 was 18.1% strokes, 30.1% trauma orthopaedics, 14.4% elective orthopaedics and 37.4% residuals.[33] The mean age of patients at the start of the rehabilitation trajectory was 78.4 years and their length of stay in the geriatric rehabilitation facility was 42.5 days on average (48.5 days for patients with stroke, 45.5 days for patients with trauma orthopaedics, 29.1 days for patients with elective orthopaedics and 41.2 days for the patients with complex health problems).[34]

The multidisciplinary team in geriatric rehabilitation facilities led by the elderly care physician, in general consists of nurses, physiotherapists and occupational therapists. Depending on the patient's needs, speech therapists, dieticians, psychologists and social workers can also be part of the multidisciplinary team. Geriatric rehabilitation facilities offer a therapeutic living environment where patients receive treatment from various disciplines. During their rehabilitation process, the intensity of exercises will gradually increase and more emphasis will be placed on independence. Rehabilitation goals are established in close consultation with patients and informal caregivers, and as soon as rehabilitation goals are reached, patients will be discharged home. This does not imply that patients need to reach the maximum of their rehabilitation potential; once it is safe to return home (in the case of Mrs Koning transfer in and out of her bed, independently

going to the toilet and wakling small distances), patients can continue their rehabilitation trajectory at home.

Challenges in geriatric rehabilitation

Mrs Koning was discharged home after she reached her rehabilitation goals and returning home has been considered as an indicator of successful rehabilitation in older patients.[24] Until recently, a considerable number of older patients were not able to return home after discharge from geriatric rehabilitation and were admitted to long-term care facilities.[35-37] In the Netherlands, only 60% of all patients admitted to a geriatric rehabilitation facility were discharged home in 2009 (the last known figures). The remaining 40% died, were admitted to a nursing home, a residential care facility or were readmitted to the hospital.[33]

Because patients are only eligible for geriatric rehabilitation if it is expected that they will return home after discharge, a good assessment of the patient is required prior to discharge from the hospital. As research showed that 40% of the patients were not able to return home, this was an indication that the assessment and triage decision for geriatric rehabilitation in the hospital needed to be optimized.

Furthermore, because these patients transfer between the hospital, the geriatric rehabilitation facility and home where they receive primary care, they are treated by several care providers in multiple settings throughout this trajectory. Mrs Koning may have required treatment from a cardiologist, a nursing team and a physical therapist in the hospital, from an elderly care physician, a nursing team, physiotherapists and occupational therapists in the geriatric rehabilitation facility and from her general practitioner, homecare nurses and a physiotherapist in the primary care setting. To achieve optimal outcomes, adequate communication, continuity and coordination of care between the professionals in these different settings is crucial. In addition, patients often experience problems during these transitions as a study of Moore and colleagues showed that 49% of all patients encounter at least one discharge-related medical error during care transitions.[38] Research has also shown that patient discharge summaries are often delayed or do not reach the organization or professionals who provide follow-up care at all;[2,39-41] moreover, individual care plans from one organization are often not communicated to the organization providing follow-up care.[41,42] Furthermore, professional roles during care transitions are often unclear and there is insufficient communication between organizations and professionals.[42] Finally, besides a lack of communication between professionals, patients and informal caregivers also indicate a need for better communication between professionals, patients and informal caregivers.[43,44]

This lack of communication, coordination and continuity of care can lead to insufficient functional improvement, disease exacerbations, avoidable hospital readmissions, high costs, avoidable permanent placement in nursing homes and even death.[2,3,40,41] Besides

these effects on patients and society, care transitions also appear to negatively affect the care burden of the informal caregivers[45]. They often indicate having feelings of anxiety and emotional burden due to lack of support during and after discharge of their family member.[46]

Due to these challenges in coordination of care across organizations, various interventions have been developed to improve these transitional phases. These interventions vary in methods but all aim to integrate care by promoting safe transfer of patients between levels of care and across settings.[47] Examples are protocolled discharge planning and home support follow-up, patient education about self-management, reconciliation of medications at discharge, telenursing for informal caregivers and counselling by telephone.[1,47-51] Another instrument which is increasingly used to improve coordination of care is the phenomenon of an integrated care pathway.[52,53]

Integrated care pathways

Integrated care pathways (also referred to as clinical pathways or critical pathways)[54] are used worldwide as a tool to enhance the quality of care by structuring or (re-)designing and streamlining care processes.[55] The definition of integrated care pathways used by the European Pathway Association (E-P-A) is "*A complex intervention for the mutual decision making and organization of predicable care for a well-defined group of patients during a well-defined period".*[56] Integrated care pathways determine best practices or required care components for a group of patients, which are locally agreed upon.[57] Pathways describe a sequence and timing of interventions and activities performed by care providers to obtain clinical goals, as well as detailed information about which professional is responsible for these interventions and activities.[58] Implementation of these pathways often leads to increased collaboration, improved clinician-patient communication and patient satisfaction, lower hospital readmissions and length of stay.[54,57,59] Clinical pathways were originally developed for high volume patient groups in hospitals, focused one specific diagnosis.[53] Examples are in-hospital pathways for stroke[60], pathways for total knee and total hip arthroplasty[61], pathways for heart failure treatment[62] and pathways for inpatient asthma management[63]. However, as patients with chronic complex (multimorbid) problems need care from different caregivers and from different care organizations, their care should be organized not only in the hospital but also across the boundary of organizations and healthcare professionals. Therefore, there is a growing interest in the development of integrated care pathways covering multiple care settings.[53] These pathways include inter-organizational aspects focusing on communication and coordination of care across organizations and on optimizing the transitional phases.[53,64,65] Research has shown that these pathways have a positive influence on collaboration between organizations, on clarification of roles and on the efficiency of care provision.[53,64]

Integrated care pathway in geriatric rehabilitation

As a response to the aforementioned challenges in geriatric rehabilitation, various pathways have been developed in the Netherlands for the four diagnosis groups in geriatric rehabilitation (stroke, trauma orthopaedics, elective orthopaedics and patients with complex health problems). The Dutch study 'SINGER' ('Synergy and Innovation in Geriatric Rehabilitation', Dutch: 'Samenwerking en Innovatie in de Geriatrische Revalidatiezorg') explored the effects of improving the quality of service delivery in geriatric rehabilitation.[66] In this study, geriatric rehabilitation facilities implemented (elements of) integrated care pathways. Results showed that professionals reported positive effects on team cooperation but that patients and informal caregivers did not report any changes.[66] Furthermore, the interventions implemented in the participating geriatric rehabilitation facilities were different from each other and concerned mostly elements of care pathways instead of fully implemented integrated care pathways.[67] Therefore, research into the effects of integrated care pathways in geriatric rehabilitation in the Netherlands is still rather scarce.

In the Maastricht area, an integrated care pathway was developed for the group of patients with complex health problems. Developing integrated care pathways is a challenging process; different professional groups need to interact and determine how the care process has to be organized and who is responsible for which task. Furthermore, patient involvement in this development process is essential to ensure patient-centeredness.[55] Therefore, successful implementation of an integrated care pathway requires a systematic approach and active participation of patients and all organizations involved.
The development, implementation and evaluation of the integrated care pathway for patients with complex health problems took place in the project 'On the road to recovery' (Dutch: 'Op weg naar herstel'), which was part of the National Care for the Elderly Program[68], an initiative of and funded by The Dutch Organization for Health Research and Development (ZonMw) to improve the quality of care for frail older people. Because patients in this group of patients with complex health problems have a variety of medical diagnoses and are mostly multimorbid, this group is very heterogeneous. Due to this heterogeneity, it appeared to be impossible to develop an integrated care pathway which focused on the nature of the rehabilitation treatment itself. Instead, the pathway focuses mainly on the process of care. It was expected that implementation of the integrated care pathway would improve independence in activities of daily living, participation and quality of life among patients, decrease the number of permanent nursing home admissions and decrease burden among informal caregivers.

Objectives and outline of the dissertation

This dissertation has three main objectives: first, to describe the development and implementation of an integrated care pathway in geriatric rehabilitation for the group of patients with complex health problems; second, to assess the acceptability and feasibility of the integrated care pathway; and third, to analyse the (cost-)effectiveness of the integrated care pathway in geriatric rehabilitation compared to usual care with respect to dependence in activities of daily living, broader activities of daily living, social participation, psychological well-being and quality of life.

The results of these three objectives are divided into several chapters. Chapter 2 presents a systematic literature review, assessing factors associated with home discharge after geriatric rehabilitation, which is often perceived as an indicator of successful rehabilitation. Chapter 3 describes the development and implementation of the integrated care pathway using the implementation framework of Grol & Wensing. Chapters 4 and 5 focus on the acceptability and feasibility of the integrated care pathway. Chapter 4 presents a Delphi study where national consensus on the content and structure of this locally developed integrated care pathway was evaluated with Dutch elderly care physicians as experts. Chapter 5 describes the results of an extensive process evaluation which assessed if the pathway was implemented according to plan, if patients, informal caregivers and professionals were satisfied with the pathway and which barriers and facilitators influenced its implementation. Chapter 6 describes the effects of the pathway on 1) activities of daily living of patients, 2) self-rated burden among informal caregivers and 3) various secondary outcome measures. These effects were assessed in a prospective cohort study with two cohorts of patients and informal caregivers who were included prior to implementation of the care pathway (care as usual cohort) and after implementation of the care pathway (care pathway cohort). In Chapter 7, the results of a cost-effectiveness analysis and a cost-utility analysis of the integrated care pathway compared to care as usual are described from a societal perspective. The final chapter of this dissertation discusses and reflects on the main findings and implications of the study, together with its methodological strengths and limitations and provides recommendations for future practice and research.

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2

FACTORS INFLUENCING HOME DISCHARGE AFTER INPATIENT REHABILITATION OF OLDER PATIENTS: A SYSTEMATIC REVIEW

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Abstract

Background: Although rehabilitation for older patients has the potential to improve function and prevent admission to nursing homes, returning home after discharge is not possible for all patients. Better understanding of patient factors related to discharge home may lead to more realistic rehabilitation goals, more targeted rehabilitation interventions and better preparation of both patient and informal caregiver for discharge. Various studies provided insight into factors related to home discharge after stroke rehabilitation, but we still lack insight into factors related to home discharge in non-stroke patients. Therefore, the aim of this review is to provide an overview of factors influencing home discharge in older non-stroke patients admitted to an inpatient rehabilitation unit.

Methods: A systematic literature search was executed in the databases PubMed, EMBASE, CINAHL and Web of Science to retrieve articles published between January 2000 and October 2015. The search focused on factors related to home discharge after rehabilitation for older patients. Studies were included if home discharge after rehabilitation was assessed as an outcome measure and if the non-stroke population was, on average, 65 years or older and admitted to an inpatient rehabilitation unit.

Results: Eighteen studies were included. The methodological quality was moderate to good in 15 studies. The factors significantly associated with home discharge are younger age, non-white ethnicity, being married, better functional and cognitive status, and the absence of depression.

Conclusions: Because various factors are significantly associated with home discharge of older non-stroke patients after rehabilitation, we recommend assessing these factors at admission to the rehabilitation unit. Further research into the factors that lack sufficient evidence concerning their association with home discharge is recommended.

Background

Hospitalization among older adults often results in functional decline and deterioration in self-care abilities.[1] Hospital stay is associated with inactivity and immobility, and prolonged hospital stay may have harmful effects such as muscle weakness, contractures and atrophy.[2] This impedes many community-dwelling older persons to return home directly after hospital discharge, especially frail patients with comorbidity and no family caregivers. In such cases, patients may be temporarily admitted to an inpatient rehabilitation unit. Such units use a multidisciplinary and comprehensive set of evaluative, diagnostic and therapeutic interventions focused on restoring functional capacity, activities of daily living and cognitive function.[3,4] A study by Bachmann and colleagues revealed that rehabilitation among older patients has the potential to improve function, prevent permanent admission to nursing homes, and to decrease mortality.[5]

Returning home is considered an indicator of successful rehabilitation and is frequently used as an indicator of quality of care.[6,7] Yet, several studies have shown that a considerable number of older patients cannot return to their initial living arrangement after discharge from a rehabilitation unit, and have to be admitted to long-term care facilities.[8-10]

Gaining more insight into the patient characteristics (measured at admission) related to returning to the initial living arrangement, may help care professionals to set more realistic rehabilitation goals and to prepare patients and informal caregivers for probable changes in their living arrangement after discharge.[11] Furthermore, increased insight into factors related to returning home may result in more accurate referrals to follow-up care after hospital discharge and therefore in a more efficient allocation of resources.[5,12-14]

In recent years, a substantial number of studies have been carried out to identify prognostic factors of home discharge after stroke rehabilitation.[15-18] Factors frequently found to be related to non-home discharge in stroke patients were older age, lower level of activities of daily living (ADL) functioning, the presence of cognitive disturbances and gender.[15] However, inpatient rehabilitation is also recommended for older patients with other medical conditions, such as those with Parkinson's disease, amputation, arthritis, orthopaedic disorders, chronic cardiac and pulmonary disease, and major multiple trauma). There is still a lack of insight into factors related to home discharge among this heterogeneous group of patients who often suffer from various comorbidities that influence the clinical course of their rehabilitation trajectory.[19] In contrast to stroke patients, non-stroke patients are more likely to be medically unstable: they are often admitted to the rehabilitation unit after trauma or an exacerbation of their illness and their rehabilitation trajectory is often complex. A better understanding in the factors related to home discharge might lead to establishing more realistic rehabilitation goals, tailored rehabilitation treatment, and a better preparation of patients and infor-

mal caregivers for the transition back home. Therefore, the purpose of the present study was to provide an overview of the factors influencing home discharge in older non-stroke patients admitted to an inpatient rehabilitation unit.

Methods

Search strategy

On the 15th of October 2015, a systematic search in four electronic databases (PubMed, EMBASE, CINAHL and Web of Science) was conducted. The search was focused on studies written in English published between 01-01-2000 and 15-10-2015. This timeframe was chosen to provide a realistic overview of the current situation in rehabilitation care for geriatric patients. Search terms used for the search strategy were the type of care, 'rehabilitation', combined with the Boolean operator 'AND' with search terms related to the rehabilitation setting ("rehabilitation unit" OR "rehabilitation center" OR "rehabilitation centre" OR "geriatric postacute rehabilitation" OR "geriatric post-acute rehabilitation" OR "intermediate care facilities" OR "skilled nursing facilities" OR "rehabilitation department" OR "inpatient rehabilitation" OR "department of rehabilitation" OR "rehabilitation ward"), the population ("aged"), the outcome measure ("discharge location" OR "living arrangements" OR "living setting" OR "independent living" OR "discharge destination" OR "home discharge" OR "community discharge") and the focus of the research question ("determinant*" OR "prognos*" OR "indicator*" OR "influenc*" OR "predict*" OR "correlat*" OR "relat*" OR "prognosis" OR "associat*"). The full search strategy can be found in an additional file [see additional file 1]. Additional studies were located based on the reference lists of the included studies.

Study selection

Studies had to meet the following inclusion criteria:

- patients with a mean (or if not provided, a median) age of 65 years or older, who were admitted to an inpatient rehabilitation unit;
- factors potentially influencing discharge destination of these patients were measured within a week after admission to the rehabilitation unit;
- discharge location (home discharge versus non home discharge) was assessed as an outcome measure.

All studies that included patients who suffered from stroke were excluded from the review, also if the stroke patients only constituted a part of the study population. Furthermore, studies that only focused on a medical diagnosis as an influencing factor of home discharge were excluded from this review.

All literature results identified in the search were uploaded into EndNote. Two reviewers (authors IHJE and SJMvH) independently assessed abstracts to identify studies meeting the inclusion criteria for further review. In cases of disagreement, the study was included for full text review. All studies assessed as relevant were obtained in full text and reviewed independently by authors IHJE and SJMvH for definite inclusion according to the in- and exclusion criteria mentioned previously. In cases of disagreement, a third reviewer (author JCMvH) made the final decision on inclusion of studies based on the full text of the article.

Data extraction and analysis

Using a structured data-extraction form, one author (IHJE) extracted data from the included studies. The primary outcome measure was home discharge. Furthermore, extracted data were study design, sample characteristics (i.e., sample size, age and gender), primary diagnosis, rehabilitation setting, discharge destination, effect size of influencing factor and interpretation. The effect sizes of the influencing factors were considered significant if they had a p-value ≤0.05. Data were categorized according to the factor that influenced home discharge.
In studies where multivariate statistical findings were presented, only these findings were extracted and incorporated into the data extraction table. In cases where only univariate statistical findings are included in the data extraction table this is an indication that the study did not display multivariate statistical findings.

Methodological quality of identified studies

Quality appraisal of the included studies was independently done by authors IHJE and JCMvH using the checklist for quality assessment of prognostic studies developed by Hayden and colleagues.[20] In cases of disagreement, results were discussed until consensus was reached. This checklist comprised six domains (A-F; see additional file 2) and each of the six domains was subdivided into three to seven items. The exact meaning of these items can be retrieved in an additional file [see additional file 2]. The items were scored with *yes*, *partly*, *no*, *unsure* or *not applicable*. 'Unsure' was used when the item was relevant for the type of study design but not clearly described by the authors. 'Not applicable' was used when the item was irrelevant for the study design and was therefore not possible to be described by the authors.
A domain scored two points if all items in the domain scored 'yes', or if one item was scored with 'partly' and the other items within the domain were scored with 'yes'. One point was allocated if the criteria necessary for receiving two points were not met but at least half of the items within the domain were scored with 'yes'. If more than half of the items of the domain were scored with 'partly', 'no', or 'unsure', the domain was allocat-

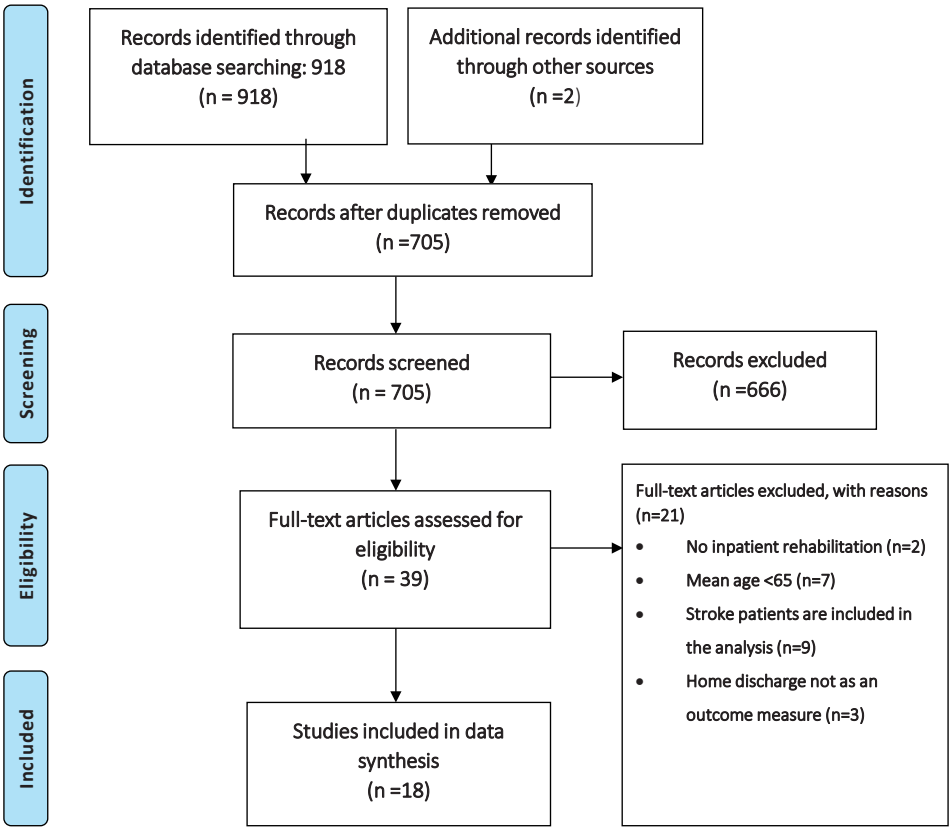
ed zero points. If at least 90% of the studies scored 'not applicable' on a specific item, that item was excluded from the domain.
Since there were six domains and a maximum of two points could be scored on each domain, the maximum possible score that could be gained was 12. The authors of the present review considered a score of 75% (9 points) or higher to be a good methodological quality score. A score between 50%-75% (6-8 points) was considered a moderate methodological quality score whereas a score below 50% (5 points or less) was considered a weak methodological quality score.[21]

Results

Included studies

Figure 1 shows the flowchart of the study identification and selection process. After removing duplicates, 705 potentially relevant articles were identified. Subsequently, after screening for title and abstract, 666 articles were excluded because they did not meet the inclusion criteria. The full texts of the remaining 39 articles were assessed, which led to the exclusion of another 21 studies. Thus, in total 18 articles were included in the review.

Figure 1. Flowchart of the Record Identification and Selection Process.



Methodological quality

Table 1 shows the methodological quality of the 18 studies, based on the guidelines for assessing quality in prognostic studies by Hayden and colleagues.[20] The quality ranged from a score of 5 to 10 points (out of a theoretical range from 0 to 12), with a median of 7.5. After excluding the items that were not applicable in more than 90% of the studies, domain A, 'study participation', consisted of five items. Domain B, 'study attrition', had one item, domain C, 'prognostic factor measurement', had five items, domain D, 'outcome measurement', had three items, domain E, 'confounding measurement and account', consisted of six items, and domain F, 'analysis', had three items.

Seven studies[22-28] had a score of at least 75% (9 points or more) of the total possible score of 12. Another eight studies[7,9,10,29-33] scored 50% - 75% (6 – 8 points) of the maximum score of 12, and three studies scored less than 6 points[14,34,35], which the authors of the present study considered of weak methodological quality.

Table 1. Methodological Quality Assessment

Author	Year	A*	B†	C	D	E	F	Total(12)
Berges[29]	2008	1	2	1	1	1	1	7
Chang[9]	2008	1	2	1	1	1	1	7
Chin[10]	2008	2	2	1	1	1	1	8
Graham[7]	2008	1	2	1	1	1	1	7
Hershkovitz[30]	2007	1	2	2	1	1	1	8
Kay[22]	2010	2	2	2	2	1	1	10
Kurichi[31]	2010	1	2	1	1	1	1	7
New[23]	2013	1	2	2	2	1	1	9
Sansone[27]	2007	1	2	2	2	1	1	9
Siebens[32]	2002	1	2	1	1	1	1	7
Vincent[33]	2006	1	2	2	1	0	1	7
Vincent[25]	2006	2	2	2	2	0	1	9
Vincent[26]	2006	2	2	1	2	1	1	9
Vincent[24]	2007	2	2	2	2	0	1	9
Vincent[34]	2008	0	2	1	0	0	2	5
Vincent[35]	2009	0	2	1	1	0	1	5
Vincent[14]	2010	0	2	1	1	0	1	5
Yan[28]	2013	1	2	2	2	1	1	9

* Domain A, 'study participation', consists of five items, domain B, 'study attrition', has one item, domain C, 'prognostic factor measurement', has five items, domain D, 'outcome measurement', has three items, domain E, 'confounding measurement and account', has six items and domain F, 'analysis', has three items.
† In domain B, four items were not used in the calculation because they were not applicable in more than 90% of the studies. In both domain C and in domain E, one item was not used in the calculation because it was not applicable in more than 90% of the items.

The full quality appraisal on all 30 items can be found in an additional file [see additional file 3].

Data extraction

The characteristics of the studies are described in tables 2 and 3. Fifteen studies were conducted in the United States, one in Hong Kong, one in Israel and one in Australia. The sample sizes range from 119 to 63,793 participants. With one exception, all studies[31] included both male and female participants.

Table 2. Characteristics of Identified Studies

Author, year, Country	Study design	Sample characteristics (n, age, gender)	Primary diagnosis	Rehabilitation setting	Discharge destination
Bergés et al., 2008, United States[29]	Retrospective cohort study	n=63,793; mean age=71.7; 66.5% female	Hip replacement	Inpatient rehabilitation facilities	Home vs. not home
Chang et al., 2008, United States[9]	Retrospective cohort study	N=9,240*; mean age=78.8; 47% female	Traumatic brain injury	Inpatient rehabilitation facilities	Home vs. not home
Chin et al., 2008; Hong Kong[10]	Prospective cohort study	n=303, mean age=82, 70% female	Hip fracture	Inpatient rehabilitation hospital	Home vs. not home
Graham et al., 2008; United States[7]	Retrospective cohort study	N=42,479; mean age=82.2; 31.4% female	Hip fracture	Inpatient rehabilitation facilities	Home vs. not home
Hershkovitz et al., 2007; Israel[30]	Prospective cohort study	N=133; mean age=80; 79.7% female	Hip fracture	Rehabilitation unit of a geriatric hospital	Home vs. nursing home
Kay et al., 2010; United States[22]	Retrospective cohort study	N=1,645, mean age=70; 57.1% female	Non-traumatic spinal cord injury	Inpatient rehabilitation facility	Residence vs. nursing home
Kurichi et al., 2013; United States[31]	Retrospective observational study	N=1,480**, mean age=66.8; 100% male	Lower extremity amputation	Veterans Affairs Medical Centres	Home vs. not home
New, 2007; Australia[23]	Retrospective , 3-year case series	N=70, mean age=65; 54.3% female	Non-traumatic spinal cord injury	Tertiary medical unit	Home vs. not home
Sansone et al., 2002; United States[27]	Retrospective study	N=143, median age=70; 39.9% female	Cardiac patients	Public acute long-term care hospital	Home vs. not home
Siebens et al., 2012, United States[32]	Multi-site prospective observational cohort study	N=224; mean age=76.8; 78% female	Hip fracture	9 skilled nursing facilities and 11 inpatient rehabilitation facilities	Home vs. not home
Vincent et al., 2006; United States[33]	Retrospective study	N=332, mean age=70.6; 63.6% female	Total hip arthroplasty	Inpatient rehabilitation hospital	Home vs. not home
Vincent et al., 2006; United States[25]	Retrospective study	N=424; mean age=70.7; 70% female	Total knee arthroplasty	Inpatient rehabilitation hospital	Home vs. not home
Vincent et al., 2006; United states[26]	Retrospective study	N=402; mean age=70.8; 62.9% female	Total hip arthroplasty	Inpatient rehabilitation hospital	Home vs. not home

Author, year, Country	Study design	Sample characteristics (n, age, gender)	Primary diagnosis	Rehabilitation setting	Discharge destination
Vincent et al., 2007; United States[24]	Retrospective, comparative study	N=146; mean age=70.8; 70.1% female	Total knee arthroplasty	Inpatient rehabilitation hospital	Home vs. not home
Vincent et al., 2008; United States[34]	Retrospective study	N=23,649, mean age=70.2; Female = 67%	Total hip or knee arthroplasty	Inpatient rehabilitation facility	Home vs. not home
Vincent et al., 2009; United States[35]	Retrospective, comparative study	N=1,947, mean age=71; female = 70.5%	Total hip arthroplasty	Inpatient rehabilitation facilities	Home vs. not home
Vincent et al., 2010; United States[14]	Multicentre, retrospective study	N=5,421, mean age=69.8; 68.6% female	Total knee arthroplasty	15 inpatient rehabilitation facilities	Home vs. not home
Yan et al., 2013; United States[28]	Retrospective study	N=119; mean age = 67.4; 5.9% female	Total knee arthroplasty/ bilateral knee surgery / total hip arthroplasty	Inpatient rehabilitation in a Veterans Affairs Medical Centre	Home vs. not home

vs. stands for 'versus'. "Home" discharge means discharge to home, the community or an assisted living facility. Discharge to "not home" means discharge to a variety of inpatient care facilities, such as a skilled nursing facility, a nursing home, or acute care.

* Before hospitalization, 8% of the total population came from intermediate care or another hospital.

** Before hospitalization, 1.5% of the total population lived in an institution.

Table 3. Data Extraction of identified Studies

Influencing factor	Study	Influencing factor specified	Discharge destination	Result	Interpretation
Age	Bergés et al., 2008[29]	Higher age	Home vs. institution	OR=0.97 (0.97-0.98)*	Higher age is related to fewer home discharges
	Chang et al., 2008[9]	Each 1 year increase in age	Home vs. institution	OR=0.99 (0.99-1.00)	Higher age is not related to discharge disposition
	Chin et al., 2008[10]	Age ≥ 80 years	Institution vs. home	OR=1.92 (1.04-3.57)*	Higher age is related to discharge to an institution
	New, 2007[23]	Higher age	Home vs. institution	Wilkinson-rank sum test; p =0.01*	Higher age is related to fewer home discharges
	Sansone et al., 2002[27]	Age	Home vs. institution	OR=1.05 (0.99-1.09)	Age is not related to discharge disposition
	Siebens et al., 2012[32]	Higher age	Home vs. institution	OR=0.92 (0.87-0.96)*	Higher age is related to fewer home discharges
	Vincent et al., 2006[33]	Age group <85 vs. ≥85	Home vs. institution	χ^2; p<0.05*	Higher age is related to fewer home discharges
	Vincent et al., 2008[34]	Age group <85 vs. ≥85	Non-home vs. home	OR=3.63(3.37-3.89)‡	Higher age is related to fewer home discharges
	Yan et al., 2013[28]	Younger age	Home vs. not home	MANOVA; p=0.04*	Younger age is related to home discharge
Ethnicity	Bergés et al., 2008[29]	Black vs. white Hispanic vs. white Asian vs. white	Home vs. institution	OR=1.23 (1.07-1.41)* OR=1.51 (1.15-1.99)* OR=1.67 (0.93-3.00)	Black race is related to home discharge Hispanic race is related to home discharge Asian race is not related to discharge disposition
	Chang et al., 2008[9]	Black vs. white Hispanic vs. white	Home vs. institution	OR=2.00 (1.55-2.59)* OR=2.24 (1.66-3.02)*	Black race is related to home discharge Hispanic race is related to home discharge
	Graham et al., 2008[7]	Non-Hispanic black vs. white Hispanic vs. white Asian vs. white	Home vs. institution	OR=2.02 (1.77-2.32)* OR=1.90 (1.64-2.19)* OR=2.07 (1.55-2.78)*	Non-Hispanic Black race is related to home discharge Hispanic race is related to home discharge Asian race is related to home discharge
	Siebens et al., 2012[32]	Non-white vs. white	Home vs. institution	OR=4.34 (0.86-21.79)	Non-white race is not related discharge disposition

Influencing factor	Study	Influencing factor specified	Discharge destination	Result	Interpretation
Marital status	Bergés et al., 2008[29]	Married vs. not-married	Home vs. institution	OR=2.42 (2.24-2.61)*	Being married is related to home discharge
	Chang et al., 2008[9]	Not-married vs. married	Home vs. institution	OR=0.45 (0.40-0.51)*	Being not-married is related to fewer home discharges
	Kurichi et al., 2013[30]	Married vs. not-married	Home vs. institution	OR=1.51 (1.14-1.99)†	Being married is related to home discharge
Functional status	Chin et al., 2008[10]	Admission FIM score <75	Institution vs. home	OR=4.68 (2.23-9.82)*	Lower functional status at admission is related to discharge to an institution
	Sansone et al., 2002[27]	Admission FIM score ≤71vs admission FIM score >72	Home vs. institution	OR=0.91 (0.85-0.96)‡	Lower functional status at admission is related to fewer home discharges
	Yan et al., 2013[28]	Admission FIM score	Home vs. institution	MANOVA p=0.00‡	Higher functional status at admission is related to home discharge
Cognition	Chin et al., 2008[10]	Admission AMT <6	Institution vs. home	OR=1.60 (0.87-2.96)	Impaired cognitive function at admission is not related to discharge disposition
	Hershkovitz et al., 2007[30]	MMSE score	Home vs. nursing home	OR=1.11 (1.03–1.20)*	Higher cognitive functional level is related to home discharge
	Siebens et al., 2012[32]	Cognitive FIM at admission	Home vs. institution	OR=1.06 (1.01-1.11)*	Better cognitive function at admission is related to home discharge
Depression	Hershkovitz et al., 2007[30]	Presence of depression	Home vs. nursing home	OR=0.30 (0.11-0.84)*	The presence of depression is related to fewer home discharges
	Kurichi et al., 2013[31]	Presence of depression	Home vs. institution	OR=0.63 (0.40-0.98)*	The presence of depression is related to fewer home discharges
Clinical severity of illness	Siebens et al., 2012[32]	Lower maximum severity	Home vs. institution	OR=0.95 (0.93-0.97) ‡	Lower severity of illness calculated by the CSI is related to home discharge
Treatment-level procedures	Kurichi et al., 2013[31]	Ongoing active cardiac pathology (yes vs. no)	Home vs. institution	OR=0.55 (0.37-0.81)†	Treatment level procedure is related to home discharge
Pre-hospital living situation	Yan et al., 2013[28]	Lives alone vs. lives with someone	Home vs. institution	Fisher's Exact Text: p=0.35	Living alone is not related to discharge disposition

Influencing factor	Study	Influencing factor specified	Discharge destination	Result	Interpretation
	Hershkovitz et al., 2007[30]	Presence of a caregiver at home	Home vs. nursing home	OR=8.88 (1.76-44.9)*	The presence of a caregiver at home is related to home discharge
Gender	Bergés et al., 2008[29]	Male vs. female	Home vs. institution	OR=1.08 (1.01-1.17)*	Male gender is related to home discharge
	Chang et al., 2008[9]	Male vs. female	Home vs. institution	OR=0.85 (0.75-0.96)*	Male gender is related to fewer home discharges
	Kay et al., 2010[22]	Male vs. female; aetiology degenerative spinal disorders	Community-based residence vs. nursing home	OR=1.00 (0.50-1.99)	Gender is not related to discharge disposition
		Male vs. female; aetiology malignant tumour		OR=0.98 (0.39-2.45)	Gender is not related to discharge disposition
		Male vs. female; aetiology vascular ischemia		OR=0.73 (0.22-2.49)	Gender is not related to discharge disposition
	New, 2007[23]	Male vs. female	Home vs. not home	χ^2; p=0.00†	Female gender is related to fewer home discharges
	Sansone et al., 2002[27]	Male vs. female	Home vs. institution	OR=1.01 (0.35-2.95)	Gender is not related to discharge disposition
	Vincent et al., 2006[33]	Female vs. male	Home vs. institution	χ^2; p< 0.05*	Female gender is related to fewer home discharges
	Yan et al., 2013[28]	Male vs. female	Home vs. institution	Fisher's Exact Test; p=0.27	Male gender is not related to discharge disposition
Comorbidity	Berges et al., 2008[29]	One or more	Home vs. institution	OR=1.14 (0.83-1.57)	The presence of one or more comorbidities is not related to discharge disposition
	Chang et al., 2008[9]	1-3 >3	Home vs. institution	OR=1.09 (0.73-1.63) OR=1.35 (0.95-1.93)	The presence of one or more comorbidities is not related to discharge disposition
	Chin et al., 2008[10]	CVA or Parkinsonism	Institution vs. home	OR=1.18 (0.56-2.51)	The presence of CVA or Parkinsonism as a comorbidity is not related to discharge disposition

Influencing factor	Study	Influencing factor specified	Discharge destination	Result	Interpretation
Comorbidity	Kurichi et al., 2013[31]	Congestive heart failure	Home vs. institution	OR=0.62 (0.45-0.85)†	The presence of congestive heart failure as a comorbidity is associated with fewer home discharges
	Sansone et al., 2002[27]	1 or more vs. 0	Home vs. institution	OR=1.13 (0.37-3.38)	The presence of a comorbidity is not associated with discharge disposition
	Yan et al., 2013[28]	Number of comorbidities	Home vs. institution	MANOVA p=0.32	The number of comorbidities is not associated with discharge disposition
Type of surgery	Chin et al., 2008[10]	Arthroplasty vs. Closed Reduction Internal Fixation (CRIF)	Institution vs. home	OR=0.99 (0.56-1.73)	Fracture management is not related to discharge disposition
	Vincent et al., 2006[26]	Home discharge in the primary total hip arthroplasty (THA) group vs. the revision THA group	Home vs. institution	Kruskal-Wallis; p<0.00‡	Type of surgery in hip arthroplasty patients is related to home discharge
	Vincent et al., 2006[25]	Home discharge in the primary total knee arthroplasty (TKA) group vs. the revision TKA group	Home vs. institution	Kruskal-Wallis; p<0.00‡	Type of surgery in knee arthroplasty patients is related to home discharge
	Vincent et al., 2008[34]	Bilateral joint procedures (THA + TKA) or unilateral joint procedures	Home vs. institution	OR=0.76 (0.49-1.01)	The type of joint procedure is not related to discharge disposition
Postoperative complications	Chin et al., 2008[10]	Chest infection or urinary tract infection	Institution vs. home	OR=1.44 (0.56-3.69)	The postoperative complications chest infection or urinary tract infection are not related to discharge disposition
	Kurichi et al., 2013[31]	Local significant infection at amputation	Home vs. institution	OR=0.57 (0.39-0.83)†	Postoperative complications are related to fewer home discharges

Influencing factor	Study	Influencing factor specified	Discharge destination	Result	Interpretation
Admission weight-bearing status	Siebens et al., 2012[32]	Weight bearing as tolerated (WBAT) vs. restricted weight bearing (RWB) after hip fracture	Home vs. institution	OR=2.58 (0.99-6.70)	Admission status "weight bearing as tolerated" is not related to discharge disposition
Hematocrit value	Vincent et al., 2010[14]	Very low haematocrit (Hct <30%) vs. low Hct (30-36% women; 30-41% men) vs. normal Hct (>36% women; >41% men)	Home vs. institution	χ^2; p>0.05	Haematocrit value is not related to discharge disposition
Distance	Yan et al., 2013[28]	Distance from inpatient rehabilitation facility in miles	Home vs. institution	MANOVA p=0.09	The distance from the inpatient rehabilitation facility is not related to discharge disposition
Length of Stay in acute setting	Chin et al., 2008[10]	>7 days	Institution vs. home	OR=1.05 (0.59-1.87)	The length of stay in the acute setting is not related to discharge disposition
Obesity	Vincent et al., 2007[24]	BMI <30kg/m^2 vs. BMI ≥30kg/m^2	Home vs. institution	χ^2; p >0.05	Obesity is not related to discharge disposition
	Vincent et al., 2008[34]	BMI ≥ 50kg/m^2 vs. BMI <50kg/m^2	Home vs. institution	OR=0.97 (0.71-1.23)	BMI is not related to discharge disposition
	Vincent et al., 2009[35]	BMI <25kg/m^2 vs. BMI 25-29.9kg/m^2 vs BMI 30-40kg/m^2 vs. BMI >40kg/m^2	Home vs. institution	χ^2; p >0.05	BMI is not related to discharge disposition
	Yan et al., 2013[28]	Difference in BMI between home discharge and not home discharge	Home vs. institution	MANOVA p=0.78	BMI is not related to discharge disposition
Pain	Chin et al., 2008[10]	VAS pain scale at admission ≥4	Institution vs. home	OR=0.61 (0.33-1.13)	Higher pain score at admission is not related to discharge disposition
Pre-fracture mobility status	Chin et al., 2008[10]	Dependent or non-walker	Institution vs. home	OR=1.84 (0.94-3.60)	Pre-fracture dependent mobility status is not related to discharge disposition

Influencing factor	Study	Influencing factor specified	Discharge destination	Result	Interpretation
Pressure sore	Chin et al., 2008[10]	Pressure sore at admission to rehabilitation	Institution vs. home	OR=1.10 (0.44-2.73)	The presence of a pressure sore at admission is not related to discharge disposition
Primary insurance	Chang et al., 2008[9]	Private vs. Medicare Medicaid vs. Medicare Other vs. Medicare	Home vs. institution	OR=1.01 (0.81-1.25) OR=1.01 (0.45-2.28) OR=1.23 (0.70-2.17)	The type of primary insurance is not related to discharge disposition
Smoking history	Sansone et al., 2002[27]	Smoker vs. non-smoker	Home vs. institution	OR=3.17 (0.86-11.63)	Smoking history is not related to discharge disposition

vs. stands for versus; CVA denotes cerebrovascular accident; FIM Functional independence measure; AMT Abbreviated Mental Test; MMSE Mini Mental State Examination; CSI Comprehensive Severity Index and VAS Visual Analogue Scale

*P<0.05; †p<0.01; ‡p<0.001

Factors influencing home discharge after inpatient rehabilitation

Twenty-four factors that potentially influenced discharge destination were identified (Table 3). Seven out of nine studies found a significant relationship between higher age and non-home discharge after inpatient rehabilitation.[10,23,28,29,32-34] The influence of ethnicity on home discharge was assessed in four studies. Three studies demonstrated that black and Hispanic ethnicity were significantly related to higher percentages of home discharge, compared to their white counterparts[7,9,29] and one study did not report a significant relationship between ethnicity and home discharge.[32] Three studies investigated the association between marital status and discharge disposition. All of these studies revealed that being married is significantly related to home discharge.[9,29,31] Three studies indicated a positive association between higher functional status at admission and home discharge.[10,27,28] Furthermore, better cognitive function at admission was significantly related to home discharge in two out of three studies[30,32] and the presence of depression at admission was significantly related to discharge to a facility rather than home, which was shown by two studies.[30,31]

The relationship between living situation (alone or with someone else) and home discharge was assessed in two studies. One study[30] found a significant relationship between having a caregiver at home and home discharge, whereas the other study did not find such an association between living alone and home discharge compared with living with someone else.[28] Four out of seven studies found a significant relationship between gender and home discharge after inpatient rehabilitation. Three studies reported a significant relationship between male gender and home discharge,[23,29,33] while one study revealed that being male is significantly related to non-home discharge.[9]

Five out of six studies demonstrated the absence of a significant relationship between comorbidity and discharge destination[9,10,27-29] while one study claimed a negative significant relationship between congestive heart failure as a comorbid disease and home discharge.[31] An exception with respect to comorbidity is the influence of obesity on home discharge, which was examined in four studies. None of the four studies demonstrated a significant relationship between obesity and discharge destination.[24,28,34,35]

Discussion

The findings from this systematic review show that home discharge after inpatient rehabilitation for geriatric patients is significantly related to younger age[10,23,28,29,32-34], non-white ethnicity,[7,9,29] being married,[9,29,31] higher functional[10,28,27] and cognitive[30,32] status and the absence of depression.[30,31] All predicting factors were measured at admission to the rehabilitation unit. Less clinical severity of the illness,[32] no active cardiac pathology,[31] and the presence of a caregiver at home[30] appeared to be significantly related to home discharge, however, these associations all come from only one study, therefore these results have to be treated with caution.
Due to inconsistent results, the association between home discharge and gender[9,22,23,27-29,33], comorbidity,[9,10,29,31] type of surgery,[10,25,26,34] living alone[28,30] and postoperative complications[10,31] was less obvious. These opposing outcomes might have been caused by differences in study populations (traumatic brain injury,[9] hip replacement,[10,29,30,33] knee replacement,[25,28] spinal cord injury[23] and lower extremity amputation[31]) or a difference in the size of the study population.[36] Further research is required to explore the impact of these factors on home discharge after inpatient rehabilitation. In addition, no significant association was found between obesity and discharge disposition.[24,28,34,35]
The association between home discharge and the factors weight-bearing status at admission (restricted or not),[32] haematocrit value,[14] travel distance from the inpatient rehabilitation facility[28], length of stay in the acute setting,[10] pain,[10] pre-fracture mobility status,[10] the presence of a pressure sore,[10] primary insurance,[9] and smoking history[27] were also not significant. Because the evidence of these non-significant associations was based on single studies, further research into the impact of these factors is required. The three studies with weak methodological quality examined the association of higher age,[34] type of surgery,[34] Body Mass Index[34,35] and haematocrit value[14] with home discharge. These effects might therefore also be treated with caution.

Discriminative ability of methodological quality assessment domains

The methodological quality of 15 out of 18 studies could be defined as moderate to good. However, the discriminative ability of four domains with respect to methodological quality is questionable. After excluding items that were 'not applicable' in at least 90% of the studies, domain B, 'study attrition', had only one item remaining. As a consequence, the score gained on that domain only ranged from 0 to 2. Since all included studies scored 2 points, this domain had no discriminative ability. The same holds for domain F focused on 'analysis'. Although this domain consisted of three items, all studies had a score of 1, which again indicates a lack of discriminative ability. Furthermore, the scores on domain C, 'prognostic factor measurement', and domain E, 'confounding measurement and account', did not vary more than one point. It seems that, although

assessing the methodological quality of the studies is done to differentiate between the quality of the included studies, some domains add very little to quality differences.

Comparison with other research

The findings from the present systematic review are in line with several prognostic factors for non-home discharge in stroke patients, as the review of Meijer and colleagues showed.[15] This latter review found that low initial activities of daily living (ADL) functioning, high age, cognitive disturbance, and being female predicted less home discharge in the sub-acute phase after stroke.[15] Other factors associated with home discharge were stroke-related factors such as paresis of arm and leg, initial level of consciousness being 'not alert' and constructional apraxia; therefore, these results cannot be compared with the results of the present review.

Factors affecting discharge destination in older medical patients who return home after hospital admission without inpatient rehabilitation are also comparable as presented in a systematic literature review by Campbell and colleagues.[37] Their review showed significant findings for functional status, cognitive functioning and age in relation to discharge destination. Gender and comorbidity appeared to have no significant relationship with discharge destination.[37]

Although this review revealed that ethnicity seems to have a significant influence on home discharge, ethnicity is not addressed in the reviews from Meijer and colleagues[15] and Campbell and colleagues.[37]

Issues to be considered

Some issues in this study need to be considered. First, we included studies with various patient populations. Although this is a good reflection of the heterogeneous population in rehabilitation, it is a methodological challenge because this hampers the comparability of the studies, and it is not clear whether a relationship observed in a specific diagnosis group will also be present in another diagnosis group. For this reason, we performed a subgroup analysis among the 13 studies that included only patients with orthopaedic disorders. When analysing the factors influencing home discharge among this subgroup, younger age, non-white ethnicity, higher functional and cognitive status still appear to be of significant value (the results are supported by at least two studies). The statistical significant effects of marital status and the absence of depression on home discharge are both supported by only one study in this subgroup analysis, and should therefore be treated with caution. This implies that, although minor differences exist, the factors influencing home discharge among the different diagnosis groups seem to be fairly comparable and may therefore be interpreted as rather robust. Apart from ethnicity, these results are also in line with influencing factors of home discharge among the stroke population.[15]

Overall, our review found 23 possible influencing factors of home discharge after inpatient rehabilitation for geriatric patients but only six factors demonstrated a clear significant and rather consistent association. Therefore, future research into the inconsistent factors and into the factors that were only examined by one study is warranted.

Study limitations

First, the quantity, intensity and quality of therapies offered within inpatient rehabilitation for older patients might differ between countries and between rehabilitation units, the received therapy was not described in the included studies and could therefore not be taken into account in this review. Despite the differences in the included studies in diagnosis, received therapy and admission rules, several predicting factors were rather similar across patients and settings thus showing their robustness as well.
Second, the validity of systematic reviews is dependent on the absence of publication bias.[38] The presentation of only those results that are significant with non-significant results being excluded from publication, could lead to misleading conclusions. Therefore, the risk of publication bias should always be taken into account when results are interpreted. Third, there is always a risk of missing studies because they were not identified by the search strategy. We tried to minimize this potential bias by not only screening articles identified by the databases, but by analysing reference lists of included articles as well.
Another limitation of our study is that the data extraction has been conducted by one researcher instead of two researchers independently, which could affect rigor. Furthermore, analytic strategies in the included studies varied; both multivariate and univariate outcomes are presented. Although this is accounted for in the methodological quality assessment, it means that some studies adjusted for confounders while others did not.
Finally, the protocol of our study has not been registered or published. Because the methods used did not change during the course of the study, we believe that this did not affect our results.

Conclusions

To help care professionals in setting more realistic rehabilitation goals and in preparing patients and informal caregivers for probable changes in living arrangement after discharge, we recommend assessing at least the following factors during admission of older patients to a rehabilitation unit: age, marital status, presence of depression, level of cognitive functioning and functional status. This assessment will help care professionals to make a more reliable prediction of discharge destination and to optimally tailor the rehabilitation treatment to the needs of the patient and their family. Because the prognostic factors of home discharge among stroke patients appears to be comparable to those of non-stroke patients, this assessment can be applied to all older patients admitted to an inpatient rehabilitation unit.

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Appendix 1. Search Strategy

PubMed:
((((determinant* OR Prognos* OR indicator* OR influenc* OR predict* OR correlat* OR Relat* OR “prognosis”[Mesh] OR associat*) AND ("Aged"[Mesh] OR "Aged, 80 and over"[Mesh]) AND ("rehabilitation"[Mesh]) AND ("rehabilitation unit" OR "rehabilitation centre" OR geriatric postacute rehabilitation OR geriatric post-acute rehabilitation OR “Intermediate care facilities”[Mesh] OR "skilled nursing facilities"[Mesh] OR "rehabilitation department" OR inpatient rehabilitation OR “department of rehabilitation” OR "rehabilitation centers"[Mesh] OR "rehabilitation ward"))) AND ("discharge location" OR "living arrangements" OR "living setting" OR "independent living" OR "discharge destination" OR "home discharge" OR "community discharge" OR “discharge disposition”)

EMBASE:
(rehabilitation.mp) AND (rehabilitation center\ OR inpatient rehabilitation.mp OR skilled nursing facilities.mp OR rehabilitation department.mp OR rehabilitation ward.mp OR department of rehabilitation.mp OR intermediate care facilities.mp OR geriatric postacute rehabilitation.mp OR geriatric post-acute rehabilitation.mp OR rehabilitation centre.mp) AND (aged\) AND (relat*.mp OR associat*.mp OR prognosis\ OR predict*.mp OR correlat*.mp OR influenc*.mp OR prognos*.mp OR indicator*.mp OR determinant*.mp) AND (discharge location.mp OR living arrangements.mp OR living setting.mp OR independent living.mp OR discharge destination.mp OR home discharge.mp OR community discharge.mp OR discharge disposition.mp)

CINAHL:
(Rehabilitation) AND (“rehabilitation center[MH]” OR “inpatient rehabilitation” OR “rehabilitation centre” OR “skilled nursing facilities[MH]” OR “rehabilitation department” OR “rehabilitation ward” OR “department of rehabilitation” OR intermediate care facilities OR geriatric postacute rehabilitation OR geriatric post-acute rehabilitation) AND (“Aged[MH]”) AND (relat* OR associat* OR “prognosis[MH]” OR predict* OR correlat* OR influenc* OR prognos* OR indicator* OR determinant*) AND (“discharge location” OR “living arrangements” OR “living setting” OR “independent living” OR “discharge destination” OR “home discharge” OR “community discharge” OR “discharge disposition”)

Web of Science:
(TS=Rehabilitation) AND (TS=”rehabilitation center” OR TS=“inpatient rehabilitation” OR TS=“skilled nursing facilities” OR TS=“rehabilitation department” OR TS=“rehabilitation ward” OR TS=“department of rehabilitation” OR TS=intermediate care facilit* OR TS=geriatric postacute rehabilitation OR TS=geriatric post-acute rehabilitation OR

TS=”rehabilitation centre”) AND (TS=Aged) AND (TS=relat* OR TS=associat* OR TS=prognosis OR TS=predict* OR TS=correlat* OR TS=influenc* OR TS=prognos* OR TS=indicator* OR TS=determinant*) AND ((TS=“discharge location” OR TS=“living arrangements” OR TS=“living setting” OR TS=“independent living” OR TS=“discharge destination” OR TS=“home discharge” OR TS=“community discharge” OR TS=”discharge disposition”)

Appendix 2. Methodological Quality Assessment Items

Study participation (A)	1	The source population or population under interest is adequately described for key characteristics.
	2	The sampling frame and recruitment are adequately described.
	3	Inclusion and exclusion criteria are adequately described.
	4	There is adequate participation in the study by eligible individuals.
	5	The baseline study sample is adequately described for key characteristics.
Study attrition (B)	6	Response rate is adequate.
	7	Attempts to collect information on participants who dropped out of the study are described.
	8	Reasons for loss to follow-up are provided.
	9	Participants lost to follow-up are adequately described for key characteristics.
	10	There are no important differences between key characteristics and outcomes in participants who completed the study and who did not.
Prognostic factor measurement (C)	11	A clear definition or description of the prognostic factor measured is provided.
	12	Continuous variables are reported or appropriate cut-points are used.
	13	The prognostic factor measure and method are adequately valid and reliable to limit misclassification bias.
	14	Adequate proportion of the study sample has complete data for prognostic factors.
	15	The method and setting of measurement are the same for all study participants.
	16	Appropriate methods are used if imputation is used for missing prognostic factor data.
Outcome measurement (D)	17	A clear definition of the outcome of interest is provided, including duration of follow-up and level and extent of the outcome construct.
	18	The outcome measure and method used are adequately valid and reliable to limit misclassification bias.
	19	The method and setting of measurement are the same for all study participants.
Confounding measurement and account (E)	20	All important confounders, including treatments, are measured.
	21	Clear definitions of the important confounders measured are provided.
	22	Measurement of all important confounders is adequately valid and reliable.
	23	The method and setting of confounding measurement are the same for all study participants.
	24	Appropriate methods are used if imputation is used for missing confounder data.
	25	Important potential confounders are accounted for in the study design.
	26	Important potential confounders are accounted for in the analysis.
Analysis (F)	27	There is sufficient presentation of data to assess the adequacy of the analysis.
	28	The strategy for model building is appropriate and is based on a conceptual framework or model.
	29	The selected model is adequate for the design of the study.
	30	There is no selective reporting of results.

Appendix 3. Methodological Quality Assessment of Included Studies

Domain	Study participation					Study attrition					Prognostic factor measurement						Outcome measurement			Confounding measurement and account							Analysis			
Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Berges et al., 2008[29]	±	±	+	+	+	+	na	na	na	na	+	+	+	+	?	na	+	+	?	±	+	+	?	na	+	+	+	?	+	+
Chang et al., 2008[9]	±	±	+	+	+	+	na	na	na	na	+	+	+	+	?	na	+	+	?	±	+	+	?	na	-	+	+	?	+	+
Chin et al., 2008[10]	+	+	+	+	±	+	na	na	na	na	+	+	+	+	?	na	+	+	?	±	+	+	?	na	-	+	+	?	+	+
Graham et al., 2008[7]	-	+	+	+	+	+	na	na	na	na	+	+	+	+	?	na	+	+	?	±	+	+	?	na	-	+	+	?	+	+
Hershkovitz et al., 2007[30]	-	+	±	+	+	+	na	na	na	na	+	+	+	+	+	na	±	+	+	+	+	+	+	na	-	+	+	?	+	?
Kay et al., 2010[22]	+	+	+	+	+	+	na	na	na	na	+	+	+	+	+	na	+	+	?	±	+	+	?	+	-	+	+	?	+	+
Kurichi et al., 2013[31]	-	+	+	+	+	+	na	na	na	na	+	?	+	+	?	na	+	+	?	+	+	+	?	na	-	+	+	?	+	+
New, 2007[23]	-	+	+	+	+	+	-	+	-	?	+	+	+	+	+	na	±	+	+	+	+	+	+	na	-	-	+	?	+	+
Sansone et al., 2002[27]	+	+	±	?	+	+	na	na	na	na	+	+	+	+	+	na	+	+	+	±	+	+	+	na	-	+	+	?	+	+
Siebens et al., 2012[32]	±	+	±	+	+	+	na	na	na	na	±	+	+	+	?	na	+	+	?	±	+	+	?	na	-	+	+	?	+	+
Vincent et al., 2006[33]	+	±	±	+	+	+	na	na	na	na	+	+	+	+	+	na	+	+	?	±	±	+	+	na	-	-	+	?	±	+
Vincent et al., 2006[25]	+	+	±	+	+	+	na	na	na	na	+	+	+	+	+	na	+	+	+	±	±	?	+	na	-	-	+	?	±	+
Vincent et al., 2006[26]	+	+	±	+	+	+	na	na	na	na	+	-	+	+	+	na	+	+	+	±	+	+	+	na	-	-	+	?	±	+
Vincent et al., 2007[24]	+	+	±	+	+	+	na	na	na	na	+	+	+	+	+	na	+	+	+	±	±	+	+	na	-	-	+	?	±	+
Vincent et al, 2008[34]	±	±	±	+	+	+	na	na	na	na	+	+	+	+	?	na	±	?	?	±	±	±	?	na	-	+	+	?	+	+

Domain	Study participation					Study attrition					Prognostic factor measurement						Outcome measurement			Confounding measurement and account							Analysis			
Vincent et al., 2009[35]	±	±	±	+	+	+	na	na	na	na	+	+	+	+	?	na	+	+	?	-	na	na	na	na	-	-	+	?	±	+
Vincent et al., 2010[14]	±	±	±	+	+	+	na	na	na	na	+	+	+	+	?	na	+	+	?	±	na	na	na	na	-	-	+	?	±	+
Yan et al., 2013[28]	+	±	±	+	+	+	na	na	na	na	+	+	+	±	+	na	+	+	+	±	+	+	+	na	-	+	+	?	+	+

'+' = item is described; '±' = item is partly described; '-' = item is not described; '?' = unknown; 'na' = item is irrelevant for the study design and therefore not described.

3

CHALLENGES IN GERIATRIC REHABILITATION: THE DEVELOPMENT OF AN INTEGRATED CARE PATHWAY

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Abstract

The coordination and continuity of care within geriatric rehabilitation is challenging. To tackle these challenges, an integrated care pathway within geriatric rehabilitation care (hospital, geriatric rehabilitation and follow-up care in the home situation) has been developed. The aim of this article is to expound on the process of developing the integrated care pathway, and to describe and discuss the results of this process (which is the integrated care pathway). Developing the integrated care pathway was done by the guidance of the first four steps of the theoretical framework for implementation of change from Grol & Wensing: 1) development of a specific proposal for change in practice; 2) analysis of current care practice; 3) analysis of the target group and setting; and 4) development and selection of interventions/strategies for change. The organisations involved in geriatric rehabilitation argued that the integrated care pathway should focus on improving the process of care, including transfer of patients, handovers and communication between care organisations. Current practice, barriers and incentives for change were analysed through literature research, expert consultation, interviews with the involved carers and by establishing working groups of health care professionals, patients and informal carers. This resulted in valuable proposals for the improvement of the care process, which were gathered and combined in the integrated care pathway. The integrated care pathway consists of agreements on a) the triage process in the hospital; b) active engagement of patients and informal caregivers in the care process; c) timely and high quality handovers; and d) improved communication between carers.

Introduction

Hospital admissions are often associated with inactivity and immobility. In older patients this may have negative consequences, such as muscle weakness, contraction, and atrophy. This, in turn, may result in functional decline and lower independence.[1] As it is not possible for all independently living older patients to return home directly after hospital discharge, they can be temporarily admitted to a geriatric rehabilitation facility. The main goal of geriatric rehabilitation is to restore the patient's functional status and independence using a multidisciplinary approach so as to enable them to return to the original home situation.[2] In the Netherlands, an approximate number of 25,000-35,000 patients are transferred from hospitals into geriatric rehabilitation facilities each year.[3]
Although a systematic literature study showed that geriatric rehabilitation leads to better functional status, fewer permanent nursing home admissions and a decreased mortality rate[4], geriatric rehabilitation facilities also face a number of challenges. Firstly, the triage for geriatric rehabilitation in the hospital appeared to be difficult; although returning to the home situation is an important goal of geriatric rehabilitation, in 2009 a mere 60% of the patients returned home after discharge from the geriatric rehabilitation facility.[5] This implies that it is not always possible to predict in the hospital if a patient is indeed a good candidate for geriatric rehabilitation. A second challenge lies in the fact that patients and informal caregivers are not always adequately involved in the decisions around their own rehabilitation programme.[6] As patients are experts when it comes to their own wishes, needs, social circumstances, habits and behaviour, it is key to involve them in such decision-making.[7] The third challenge lies in the fact that patient discharge summaries in the whole trajectory are not always received in time and often lack sufficient quality. This can have negative consequences for the rehabilitation process and may lead to dissatisfaction among patients and informal caregivers about the provided care.[8-10] Lastly, a wide array of care providers are involved in the geriatric rehabilitation trajectory, making it quite a gauge to correctly attune and coordinate the care within and between the different care settings.[11]
For these reasons, the NPCF (Dutch Patient and Consumer Federation) initiated the "*Zorgpaden voor Herstelgerichte Zorg*" [Care Pathways for Recovery-Focused Care] project in 2009. This project aspired to improve the quality, efficacy, and coherence in geriatric rehabilitation and to prepare for the legislative changes in 2013, when the nationally insured geriatric rehabilitation care would come under a new health insurance. To achieve this, care pathways were developed. These care pathways were understood to be a description of the entire care chain, including cross-organizational agreements between hospitals, geriatric rehabilitation facilities, and the providers of primary care in the home situation.[12]
The NPCF asked experts to draft integrated care pathways for the four diagnosis groups within geriatric rehabilitation: strokes, elective orthopaedics, trauma orthopaedics, and

the residual, referred to as patients with complex health problems (such as cardiac problems, respiratory problems, neurological problems and internal problems). This article reports on the (further) development of the draft pathway for the group of patients with complex health problems. Our objective is to explain the various steps that were taken in the developmental process and to describe and discuss its final result.

Methods

Theoretical framework

To realise successful development and implementation of an innovation, it is essential to utilize a plan-based approach. Various theories and models have been developed for the implementation of change.[13,14] In this study, the implementation model of Grol & Wensing was used as a directional framework.[13] This model comprises seven steps: the 1) development of a proposal for change; 2) analysis of the actual care and specific improvement objectives; 3) analysis of the target group and settings; 4) development and selection of interventions/strategies; 5) development, testing, and execution of the implementation plan; 6) integration in routines; and 7) (continuous) evaluation and adjustment of the plan (if necessary). The first four steps of this framework were used to (further) develop the integrated care pathway and are elaborated on in this article.

Development of a proposal for change (step 1)

The first step in Grol & Wensing's model is the development of a specific and feasible proposal for change in day-to-day practice.[13] This proposal should be of high quality and meet the needs of the target group.[13] A multidisciplinary project group was established in the region of Maastricht to formulate this proposal for change.

Analysis of the actual care delivery and specific improvement objectives (step 2)

Grol and colleagues indicate that prior to implementation of an innovation, insight in the quality and safety of the actual care provision is required. This includes knowledge about the degree the current care provision deviates from the desired care provision (the integrated care pathway).[13] Based on this gap, specific improvement objectives can be established.
To gain insight into the actual care for patients in geriatric rehabilitation in the Maastricht area and the deviations from the desired situation (the drafted care pathway), nine semi-structured interviews with care providers in the three care settings involved (hospital, geriatric rehabilitation facility and primary care) were conducted in de period

April - July 2012. The care providers were purposefully selected on the basis of their involvement in the care provision in the pathway. In these interviews, the respondents were asked about screening and assessment procedures, the process of triage, transfer of patients and discharge summaries, aftercare in the home situation and the integrated and multidisciplinary process of geriatric rehabilitation. The questions were adapted to the specific setting where the respondent was employed. The respondents were also questioned as to what they regarded as possible barriers and obstacles in the implementation of the integrated care pathway. The interviews were tape-recorded and transcribed. The transcripts were subsequently coded, summarised, and sent to the interviewees to be checked.[15] Based on the results from the interviews, the project group members drafted specific improvement objectives, which formed the foundation for the other steps that were to be taken in the (further) development and implementation of the integrated care pathway.

Analysis of the target group and setting (step 3)

Grol & Wensing posit that in step 3, the context (where the change is to take place) must be analysed, together with the characteristics of target groups and barriers and facilitators of the change process.[13] In order to do so, three different workgroups were established with regional and national stakeholders in geriatric rehabilitation. One of these workgroups consisted of 13 care providers who were all working in healthcare organisations involved in geriatric rehabilitation in the Maastricht region: the hospital (n=3), the geriatric rehabilitation facility (n=3), and primary care organisations (n=7), i.e. general practices, homecare organizations, organizations with allied health professionals and welfare organisations. The workgroup consisted of care providers (physiotherapists, an occupational therapist, a general practice-based specialist nurse, a hospital-based nurse specialist, and an elderly care physician), transfer consultants, managers, and policymakers.

The second workgroup consisted of 12 representatives of national interest groups, such as representatives of Actiz (a branch association of long-term care organizations), health insurers, the informal care support centre and the NPCF. This workgroup analysed the target group and setting considering nationwide implementation of the pathway. The third workgroup consisted of a consultant of the informal care support centre and three older members with wide experience in health care and elderly care. This workgroup concentrated on the analysis of the target groups and contexts from the perspectives of the patient and their informal caregivers.

Multiple meetings were organised for all workgroups and during these meetings, the characteristics of patients, informal caregivers and care providers in the pathway were analysed. This was also done for the institutions involved in the integrated care pathway (the 'setting'). All the meetings were chaired by one of the members of the project group mentioned in step 1 and after each meeting a report was written including the

main issues discussed. These reports were submitted to the relevant workgroup for their approval. The information from these reports was organized and combined into an overview of the context and characteristics of each target group.

Development and selection of interventions/strategies (step 4)

Step 4 in Grol & Wensing's implementation model is the development and selection of interventions and strategies based on the results of the first three steps.[13] This step was taken by the aforementioned three workgroups and chaired by a project group member. Between 2012 and 2014, 20 meetings were organised to discuss the most suitable strategies and interventions for implementation of the pathway and, where necessary, to attune the pathway to current developments. During these meetings, all practical and financial possibilities and constraints were taken into account. After each meeting a report was written including the additions to and adjustments in the pathway and possible implementation strategies. These reports were also critically discussed in the meetings of the other workgroups.

Results

Development of a proposal for change (step 1)

The project group in Maastricht consisted of 6 members: a professor of Elderly Care Medicine, a professor of Social Gerontology, a senior researcher, a PhD student, an implementation expert and a managing director of a geriatric rehabilitation facility. Based on literature research, consultation of experts of local and national interest groups and meetings with healthcare providers, the project group decided to take the pathway for the patients with complex health problems (drafted by the NCPF) as its point of departure.[16] The proposal for change consisted of the further development and implementation of this pathway in the Maastricht region with national implementation as its final goal. The primary focus of this integrated care pathway was improving the care processes, including transfers, handovers and communication between the hospital, geriatric rehabilitation facility and primary care providers.

analysis of the actual care and specific objectives for improvement (step 2)

In the hospital, a transfer consultant, a specialist nurse, and the manager of the Internal Medicine Department's nursing ward were interviewed. The interviewees at the geriatric rehabilitation facility were an admission consultant, a physiotherapist and a nurse

practitioner. As for primary care, the interviewees were a homecare policy consultant, a physiotherapist, and a general practitioner (GP).
The main findings from these interviews are shown in Table 1. Multiple care providers at the hospital stated that the admission criteria for geriatric rehabilitation should be clarified and that there was a need for an adequate instrument for triage. Furthermore, the discharge summaries from hospital to the geriatric rehabilitation facility and from the geriatric rehabilitation facility to primary care were not always complete and transferred in time. Finally, there was a need for more and better (multidisciplinary) communication across the entire chain.

Table 1. Analysis of The Actual Care Before The (Further) Development of the Integrated Care Pathway.

Component	Analysis
Geriatric screening	*Hospital:* At admission, a geriatric Trazag screening is done; this instruments maps out the patient's problem and care situation.[17] The information obtained from this screening instrument is not used as often as it should in the triage for geriatric rehabilitation due to insufficient access to the information and doubts about its usability.
	Geriatric rehabilitation facility: The hospital and geriatric rehabilitation facility make use of the same screening instruments. This adds strain on the patient because they have to answer the same questions twice.
Triage	*Hospital:* There is no uniform policy regarding the referral criteria to geriatric rehabilitation.
	Geriatric rehabilitation facility: The through flow slows down due to the admission of patients with no prospect of returning to the home situation.
Handovers and communication	*Hospital:* Patient and family often have little idea of the actual objective of geriatric rehabilitation. *Hospital:* There is not enough consultation between providers in the hospital and the geriatric rehabilitation facility.
	Geriatric rehabilitation facility: The information handed over from the hospital to the geriatric rehabilitation facility is not always complete or prompt.
	Primary care: The referral and handover information to GPs, homecare organisations, and physiotherapists is not always complete or prompt. *Primary care:* Hardly any multidisciplinary consultations are organised within primary care.
Rehabilitation	*Primary care:* Patients do not always actively continue their rehabilitation program at home. *Primary care:* The transition from the 'safe' geriatric rehabilitation facility to the home situation can be a too big for patients.

Based on the analysis of the actual care provision, the project group drafted specific improvement objectives (step 2). These are shown in Table 2.

Table 2. Specific Improvement Objectives

No.	Improvement objective
1	The triage at the hospital is optimised by the development of an instrument for triage.
2	The information obtained from the geriatric screening and the 'Trazag' assessment instrument is used in the triage for geriatric rehabilitation.
3	Patients and informal caregivers are closely involved in the design of their care and treatment plan and receive information about the possibilities for follow-up care in a timely fashion.
4	The patient discharge information is relevant for the organisation that will provide the follow-up care and is sent on the day of discharge at the latest.
5	More communication is organised within and between the various professionals and organisations to improve the coordination of care as well as the collaboration between professionals.
6	In the home situation, attention is paid to enhancing participation and improving the patient's quality of life.

Analysis of the target group and setting (step 3)

The meetings of the three workgroups described in the methods section resulted in an overview of target groups and organisations with an interest in the development and implementation of the integrated care pathway, as well as in the identification of potential barriers and facilitators. As previously mentioned, the pathway is related to three settings: the hospital, the geriatric rehabilitation facility, and primary (after-) care. In each setting, various target groups that play a role in the integrated care pathway could be distinguished. In the hospital, these are the nurses, specialists, allied health professionals and transfer consultants; as for the geriatric rehabilitation facility, admission consultants, elderly care specialists, nurses and allied health professionals play a role. Finally, in primary care, the target groups comprised GPs, GP-based nurse specialists, pharmacists, and homecare and allied health professionals.

The workgroups analysed the interests of these groups in the implementation of the integrated care pathway. It appeared that explicit willingness to participate in the implementation of the pathway was present among transfer consultants at the hospital, admission consultants, elderly care physicians, nurses and allied health professionals at the geriatric rehabilitation facility and general practitioners, their specialist nurses and professionals in homecare organizations in primary care. These professionals were directly involved in the care provision and suffered the consequences of the lack of coordination and continuity. Another important promoting factor in the willingness to participate was that all the managers and supervisors of these care providers supported the change process. Barriers in the implementation process were also mentioned. First, due to the heterogeneity of the patient group, a wide variety of care providers were involved which might result in communication problems. Furthermore, the presence of

a high workload in the organizations involved was mentioned as a reason for not always handing over full and timely discharge information about a patient and/or attending all the relevant meetings. Finally, the organisations involved shied away from writing down the intended changes in a result-oriented manner, possibly out of fear of being judged if the changes proved to be infeasible in practice.

Development and selection of interventions/strategies (step 4)

The workgroups decided to implement the pathway on the basis of specific agreements which were combined in a joint "integrated care pathway document". This document served as an incremental document, in the sense that the workgroups could – and did – continually add elements. The document was signed by the management of the hospital, the geriatric rehabilitation facility, and the regional GP organisation. The document's most important elements are summarised in Table 3. To actually make the agreements in the document happen, the following measures were taken: 1) A care pathway coordinators was appointed who acted as link between the care providers in the different organisations; 2) a triage-instrument was developed aimed at improving the triage for geriatric rehabilitation at the hospital; 3) the document used to transfer patient information from geriatric rehabilitation to homecare organisations was modified according to the homecare organisations' needs; 4) the care pathway coordinators initiated the multidisciplinary meetings described in the document; 5) the geriatric rehabilitation facility developed an assessment programme for patients to be able to determine an appropriate treatment plan in close consultation with the patient and their informal caregiver.

Table 3. The Core Components of the Integrated Care Pathway in Geriatric Rehabilitation

Setting	Care pathway component
Chain-wide	Two care pathway coordinators act as link between the care providers at the hospital, in the geriatric rehabilitation facility and in primary care and focus on the optimisation of communication, handovers, and transfers.
Hospital	If the main treatment provider believes that the patient is eligible for geriatric rehabilitation, the transfer consultants will be consulted. This consultation preferably takes place well in advance of dismissal.
	The patient and (if necessary) the informal caregiver should always be asked about their needs and abilities and this should explicitly be taken into account when making the triage decision.
	Discharge from the hospital is preceded by a triage under the responsibility of an elderly care physician. The following aspects are taken into account: the patient's and caregiver's functional prognosis, endurability, teachability/trainability, needs, and possibilities.
	On the day the patient is discharged from the hospital, an up-to-date list of medications, a medical and nursing discharge summary and, if necessary, a discharge summary from allied health professionals should be available for the professionals in the geriatric rehabilitation facility.
	Every 3 months, a meeting is organized between the professionals involved in the triage at the hospital and the geriatric rehabilitation facility with the aim of optimising their collaboration.
Geriatric rehabilitation facility	At admission, every patient is assessed in order to determine an appropriate treatment programme.
	The care and treatment plan and the rehabilitation objectives are determined in close consultation with the patient and informal carer.
	If necessary and well before discharge, the patient’s home situation should be mapped out by a physiotherapist or occupational therapist. The necessary helping aids in-home modifications are applied for In close consultation with the patient and their informal caregiver.
	Homecare is applied for at the homecare organisation of the patient’s preference 3-5 days before discharge.
	If necessary, the homecare organisation performs an intake at the geriatric rehabilitation facility.
	On the day the patient is discharged from the geriatric rehabilitation facility, an up-to-date list of medications, a medical and nursing discharge summary and, if necessary, a discharge summary from allied health professionals should be available for the professionals in primary care.
	The nursing handover information is also sent to the GP or elderly care specialist nurse, including information about recommended care from allied health professionals.
Primary care	At least once a year a meeting is organized between professionals from the geriatric rehabilitation facility and from primary care to evaluate the timing and quality of the medical discharge summaries and patient transfers and to discuss how their collaboration can be further optimized.
	The elderly care specialist nurse or district nurse in primary care acts as the patient's case manager and watches over (any) possible deterioration in health.

Discussion and conclusion

The (further) development of the integrated care pathway was a process of continuous adaptation, optimisation and evaluation of the draft pathway, using the experiences gained from the first four steps of the implementation of change model of Grol and Wensing. This stepwise development of the integrated care pathway based on experienced barriers and facilitators in geriatric rehabilitation, resulted in a practically applicable pathway which has the potential to improve the continuity and coordination of care.

This developmental process resulted in translating the following improvement objectives (Table 2) into agreements in a joint care pathway document: an instrument for triage was developed (objective 1); agreements were established about the active involvement of patients and their informal caregivers in decisions regarding their own rehabilitation trajectory (objective 3); agreements were established on the content and timing of patient discharge summaries to organisations providing follow-up care (objective 4); agreements about structural meetings between the hospital, the geriatric rehabilitation facility and primary care organisations were recorded (objective 5); and the GP-based nurse specialist or district nurse in primary care takes the role of the patient's case manager (objective 6). However, some improvement objectives have not been included. Firstly, using information from the 'Trazag'[17] geriatric screening instrument (objective 2) was not incorporated in the care pathway document. The Trazag explores care problems among patients aged ≥ 70 who are admitted to the hospital. This information could be used in the triage for geriatric rehabilitation.[17] However, the Trazag score is assessed at the moment of hospital admission. According to professionals involved, the situation of the patient usually changes too much in the period between hospital admission and discharge that using the Trazag results in the triage decision might be of too less added value. Therefore, information sources other than Trazag are used when inventorying the patient's functional prognosis, endurability, teachability/trainability, needs, and possibilities. These sources may include, for instance, consultation with the patient and informal caregiver themselves, consultation with the specialist responsible for the treatment, nurses, allied health professionals, the geriatrician, and a review of the patient records.

As for improvement objective 5, the larger part of the objective was realized in the care pathway document. However, still lacking are agreements between primary care providers on improving communication and coordination of care. This is due to the fact that after discharge from the geriatric rehabilitation institution, patients fan out over the entire region, where they subsequently encounter various care providers (GPs, specialist nurses, district nurses, homecare workers, physiotherapists, occupational therapists and other allied health professionals). Given the large number of these professionals and their regional dispersion, each of these providers comes across a relative-

ly small number of patients who are discharged from the geriatric rehabilitation facility. It is therefore difficult to actively involve all these professionals. In any further development of the pathway, it is advised to pay extra attention to these improvement objectives.
We used Grol & Wensing's[13] implementation model in the (further) development of the integrated care pathway. A limitation of this model is that it primarily relates to the implementation of an already developed intervention rather than its (further) development. We did decide to take this model as our basis because it was expected that closely involving and analysing target groups would result in the pathway's enhancement and refinement. However, the (further) development of the pathway cannot be regarded as inseparable from its implementation. Integrating the development and implementation has the advantage of attuning the pathway to the needs of the target groups and care organisations involved, which, in turn, increases the chance of successful implementation of the pathway in routine care.

The next steps in the implementation model are the actual integration of the pathway in the routines as well as the continuous evaluation and any optional adjustments of the implementation plan.[13] Effect, process, and economic evaluations of the integrated care pathway are currently conducted in a prospective study in the Maastricht region. The effect evaluation assesses if the care pathway improves independence in activities of daily living, social participation, psychological well-being and quality of life of patients with complex health problems. The process evaluation will describe the feasibility of the pathway and assesses whether or not the pathway is implemented as planned, and the extent to which patients, informal caregivers and healthcare professionals were satisfied with the integrated care pathway.
The economic evaluation compares the costs of health care use before and after the implementation of the pathway. Finally, a Delphi consensus study will be conducted. The objective of that study is to reach national consensus among experts in geriatric rehabilitation on the content and structure of the pathway. This study aims to increase the chances of dissemination of the integrated care pathway on a nationwide level.

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4

BUILDING CONSENSUS ON AN INTEGRATED CARE PATHWAY IN GERIATRIC REHABILITATION: A MODIFIED DELPHI STUDY AMONG SPECIALIZED ELDERLY CARE PHYSICIANS

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Submitted

Abstract

To improve continuity and coordination of care for older adults transferring between the hospital, a geriatric rehabilitation facility and primary care, an integrated care pathway in geriatric rehabilitation was developed. The objective of this study was to reach national consensus on the content and structure of this integrated care pathway usinga two-round Delphi study with elderly care physicians specializing in geriatric rehabilitation (n=37) as experts. These professionals were chosen as they have wide experience within the total geriatric rehabilitation trajectory. In the first round, experts indicated their level of agreement on 65 statements representing the pathway on a 5-point Likert scale. Consensus was reached if the interquartile range was ≤1. Statements that did not gain consensus were redistributed to participants in Round 2. After Round 1, consensus was reached on 56 statements (86%). After Round 2, consensus had been reached on 60 statements (92%). In total, 53 statements were assessed as relevant for inclusion in the pathway and seven statements were considered not relevant enough and were therefore excluded from the pathway. On five statements, no consensus was reached. Based on these results, we can conclude that there is broad nationwide consensus on the locally developed integrated care pathway and therefore it has the potential to be disseminated and implemented on a wider scale.

Introduction

Frail older people, who have been admitted to hospital due to complex health problems such as neurological, musculoskeletal, cardiovascular or pulmonary diseases, are often unable to return home directly after discharge. These people may require treatment in a geriatric rehabilitation facility before returning to their home situation. In such geriatric rehabilitation facilities (which in the Netherlands are usually situated in a nursing home) they receive treatment to enhance functional status, independence and self-care. [1, 2]

Patients who receive geriatric rehabilitation transfer from the hospital to the geriatric rehabilitation facility and then to the home situation, where they often receive primary care. As a consequence, patients are confronted with various organisations and professionals during this trajectory, which can threaten continuity of care. [3-6] This lack of continuity can be caused by several factors, such as inappropriate communication between professionals from different organisations and disciplines [4, 6], the absence of correct and timely medication discharge summaries [4, 6, 7] and professionals neglecting to transfer individual care plans to the organisation providing follow-up care. [4, 5] Furthermore, patients and informal caregivers are not always adequately informed about what to expect in the next care setting [4, 5] or are not sufficiently prepared for the transition to the final home situation. [3, 4] These examples of threats in continuity of care might lead to negative events, such as insufficient functional improvement, disease exacerbations, unnecessary hospital readmissions, additional costs, premature permanent placement in nursing homes and even death.[4, 6-9]

To achieve optimal care throughout the trajectory of hospital admission, geriatric rehabilitation and primary care, the challenges in continuity and coordination of care need to be tackled. A strategy which is increasingly being used to improve coordination of care is the integrated care pathway.[10] Integrated care pathways describe a sequence and timing of activities or interventions performed by care providers to obtain clinical goals. They comprise detailed information about which professional is responsible for these interventions and activities.[11] To tackle challenges in continuity and coordination of care for patients following the trajectory of hospital admission, admission to a geriatric rehabilitation facility and discharge back to the community, an integrated care pathway (further referred to as the 'pathway') was developed in an urban region in the south of the Netherlands. Three multidisciplinary workgroups of stakeholders in geriatric rehabilitation developed the pathway in the period 2012-2014. The first workgroup consisted of professionals directly involved in the care provision alongside the pathway such as nurses, physiotherapists, occupational therapists, general practitioners and employees of homecare organizations. They represented the three settings involved (hospital, geriatric rehabilitation and primary care). The second workgroup comprised representatives of national interest groups, such as delegates of the national organisa-

tion for care providers, health insurers and a representative from the informal care support centre. The last workgroup represented patients and informal caregivers. The workgroups met 20 times in total and, based on current care delivery, desired care delivery,and barriers and facilitators in the development and implementation process, the integrated care pathway was developed. The development of the pathway is described in more detail elsewhere. [12] The newly developed pathway focused on improving communication, triage and transfers of frail older patients between the hospital, geriatric rehabilitation facility and primary care organisations.

The five key components of the pathway were: 1) the appointment of a care pathway coordinator who encourages communication and information exchange between the organisations involved; 2) the use of a newly developed triage instrument in the hospital which provides guidance and support in the decision whether patients are referred to geriatric rehabilitation or to another form of rehabilitation; 3) the active involvement of patients and informal caregivers during important decisions during the rehabilitation trajectory; 4) the timeliness and high quality of all patient discharge summaries from the hospital to geriatric rehabilitation and from geriatric rehabilitation to primary care; and 5) the organisation of structural meetings between care professionals from the hospital, the geriatric rehabilitation facility and primary care to evaluate and improve collaboration between the organisations.

Although care delivered through the pathway is now standard practice in the region it was developed, the goal is to disseminate and implement this pathway nationwide. However, as regions and organisations differ in culture, resources and networks, not all elements of the pathway might be feasible and acceptable for other organisations. Therefore, the objective of this study was to reach national consensus among experts in geriatric rehabilitation on the content and structure of the pathway, using a Delphi panel. This should result in an integrated care pathway in geriatric rehabilitation which is generically applicable and therefore appropriate for implementation on a nationwide level in the Netherlands and even abroad.

Methods

Integrated care pathway

In the Netherlands, patients in geriatric rehabilitation have been classified into four main categories: (a) patients with stroke, (b) trauma orthopaedic patients, (c) elective orthopaedic patients and (d) a residual group of patients, referred to as older patients with complex (geriatric) health problems. This pathway was specifically designed for patients with complex health problems. This particular group is suffering from multimorbidity, mostly involving cardiac problems, problems with the respiratory system,

neurological problems, internal problems and oncological problems. Such problems are all associated with considerable disabilities, care dependency and polypharmacy. Because of the heterogeneity of this group, the pathway is not focused on the characteristics of the treatment but on the care process. As mentioned in the introduction, the key components of the integrated care pathway consist of the appointment of a care coordinator, the use of a triage instrument, the active involvement of patients and their informal caregivers, the timing and quality of patient discharge summaries and structural evaluation meetings between organisations involved. Prior to implementation of the pathway, there was no care coordinator appointed and when assessing which patients could be referred towards the geriatric rehabilitation facility, nurses in the hospital did not use an official triage instrument. There were also no structural evaluation meetings between the organisations involved. Furthermore, the active involvement of patients and informal caregivers and the timeliness and quality of patient discharge summaries were not officially listed in agreements or protocols.

Research design

To assess the level of consensus on the pathway, we used a modified Delphi method. A Delphi method aims to reach consensus among experts through rounds of structured questionnaires.[13] The elements of the pathway developed by the three multidisciplinary working groups served as the basis for the Delphi study and were presented to a panel of experts in the form of statements.

Participants

The experts who were asked to participate in this Delphi study were Dutch elderly care physicians (n=82) specializing in geriatric rehabilitation, with at least one year of working experience. The Dutch National Association of Elderly Care Physicians ("Verenso") provided contact details for their network of elderly care physicians additionally educated in geriatric rehabilitation; these physicians were invited to participate in our study.[13] Elderly care physicians are focused on the care of frail older people with chronic, complex diseases. Contrary to hospital geriatricians, they work primarily in nursing homes and geriatric rehabilitation facilities and specialize in geriatric disorders and the particular appearances of diseases and disorders in elderly people.[14] In the Netherlands, elderly care medicine (formerly nursing home medicine) is an official registered medical specialization. The professionals were chosen because of their wide experience with the total geriatric rehabilitation trajectory, which starts in the hospital and finishes in primary care. They have to give approval on the triage decisions in the hospital and have frequent contact with primary care providers. Therefore, we expected them to have a complete view of all settings.

List of statements

Two researchers (authors IHJE and JCMvH) developed the first draft of the list with statements for the Delphi study. The list was comprised of 34 statements addressing the main components of the pathway. Furthermore, five professionals (three elderly care physicians, a nurse and a project manager) from healthcare organisations offering geriatric rehabilitation were questioned about additional topics that the researchers believed were underrepresented in the list. These topics were: a) the use of screening and assessment instruments in the geriatric rehabilitation facility; b) the active support of patient self-management in the geriatric rehabilitation facility; c) managing patient expectations throughout the whole trajectory; d) the appointment of a first responsible professional for the patient; and e) deciding on the intensity of therapy and length of stay in the geriatric rehabilitation facility. These professionals were interviewed by telephone and based on their answers, nine additional statements (including sub questions) were developed and added to the list of statements. Subsequently, the list was sent to two experts in the field of geriatric rehabilitation for critical reflection. The feedback provided by the experts on the revised list was discussed with the two researchers (authors IHJE and JCMvH). Based on this feedback, the list was adjusted accordingly. The final list consisted of 45 statements (second column Table 2). Two statements consisted of 16 and 6 sub statements, respectively, making the total number of statements 65. These 65 statements were divided across eight different domains: 1) screening and triage in the hospital (n=8 statements); 2) transfer from hospital to geriatric rehabilitation facility (n=3 statements); 3) structural meetings between hospital, geriatric rehabilitation facility and primary care (n=2 statements); 4) establishment of care and treatment plan in the geriatric rehabilitation facility (n=32 statements); 5) information provision and patient empowerment in the geriatric rehabilitation facility (n=3 statements); 6) transfer from the geriatric rehabilitation facility to primary care (n=14 statements); 7) care provision in primary care (n=2 statements); and 8) the care pathway coordinator (n=1 statements). The list with statements was distributed using the online survey software Qualtrics (www.qualtrics.com).

Data collection and data analysis

Delphi Round 1

The aim of the first Delphi round was to assess to what extent experts agreed on the content and structure of the pathway. The elderly care physicians specialized in geriatric rehabilitation received an email on the 31st of August 2015 in which they were invited to complete the online list of statements within four weeks. The link to the list was provided in the email. In the list of statements, the participants were asked to indicate their level of agreement on the statements on a 5-point Likert scale from completely

disagree (1) to completely agree (5). It was also possible to give an explanation after each statement. Non-respondents were reminded after a period of three weeks.

Consensus

Consensus was computed using the Inter Quartile Range (IQR). The IQR calculates the difference in the scores between the 25th and the 75th percentile.[16] Although there is no agreement in the literature on the value the IQR should have to ensure consensus, an IQR of ≤1 on a 5-point Likert scale is often used [17-19] and was therefore adopted to assess consensus among the participants in this study as well. When the IQR of a statement was ≤1, it was considered that consensus on the item was reached and the item was removed from the second round list of statements. If the IQR of a statement was ≤1 and the median score on that statement was 4 or 5, we concluded that that this statement was considered to be important and it was therefore included in the final set of statements of the pathway. When the IQR of a statement was ≤1 and the median was 1 or 2, we concluded that participants considered that statement to be unimportant and it was eliminated from the pathway. If the IQR of a statement was ≤1 and the median score on that statement was 3, participants appeared to be neutral about the importance of that statement. In these situations, we decided to check the percentages: if the percentage of participants assessing this statement with a 4 or 5 was higher than the percentage of participants who assessed it with a 1 or 2, we decided to include this statement the final set of statements. If this was the other way around, the item was excluded.

Delphi Round 2

The second Delphi round was aimed at seeking further consensus on the statements of the pathway. After retrieving the answers for the first Delphi round, median and IQR scores for each of the 65 statements were calculated. The second list of statements included only the statements which did not reach consensus in the first round. To have participants reassess their original answers, every statement was accompanied by information about both their own response to that statement in Round 1, as well as the distribution of responses of the whole group to that statement in the first round. We assumed that information about the answers of the group as a whole might lead to a higher level of consensus.[16] Furthermore, participants received information about which statements had gained consensus in the first round, hoping that this would stimulate participants to seek consensus on the other statements. Only the participants who completed Round 1 were invited to participate in Round 2. These participants received an email with a link to the second list of statements on the 4th of November 2015. Non-respondents were reminded after a period of three weeks.

Additional remarks provided by participants were combined by author IHJE based on the matching content of the answers and served to underline the results.

Results

Participants

Of the 82 elderly care physicians who were invited to participate in the first Delphi round, 37 (46%) evaluated the first list of statements. Their demographics are displayed in Table 1. Of the 37 participants who completed Round 1, 29 (78% of 37) also completed Round 2. Table 1 shows that the majority of participants were female (70%), over 45 years of age and had more than 10 years of experience as an elderly care physician specialized in geriatric rehabilitation (70%).

Table 1. Background Characteristics of Delphi Participants

n=37	n	%
Gender (Female)	26	70%
Age:		
<45 years	10	27%
≥45 years	27	73%
Years' experience as elderly care physician:		
<10 years	11	30%
≥10 years	26	70%
Size of geriatric rehabilitation facility:		
< 300 patients per year	20	54%
≥ 300 patients per year	17	44%
Involvement in triage for geriatric rehabilitation:		
I do the triage myself	19	51%
Someone else does the triage	18	49%

Delphi process

After Round 1, consensus was reached (IQR≤1) on 56 statements (86%). Because the elderly care physicians did not reach consensus on nine statements, these statements were re-introduced in Round 2. After Round 2, the experts came to consensus on four additional statements, which means that finally consensus was reached for 60 statements (92%). Figure 1 shows the number of statements in each domain that gained consensus after Round 1 and after Round 2.

Figure 1. Number of Statements in Each Domain for Which Consensus Was Gained After Round 1 and after Round 2

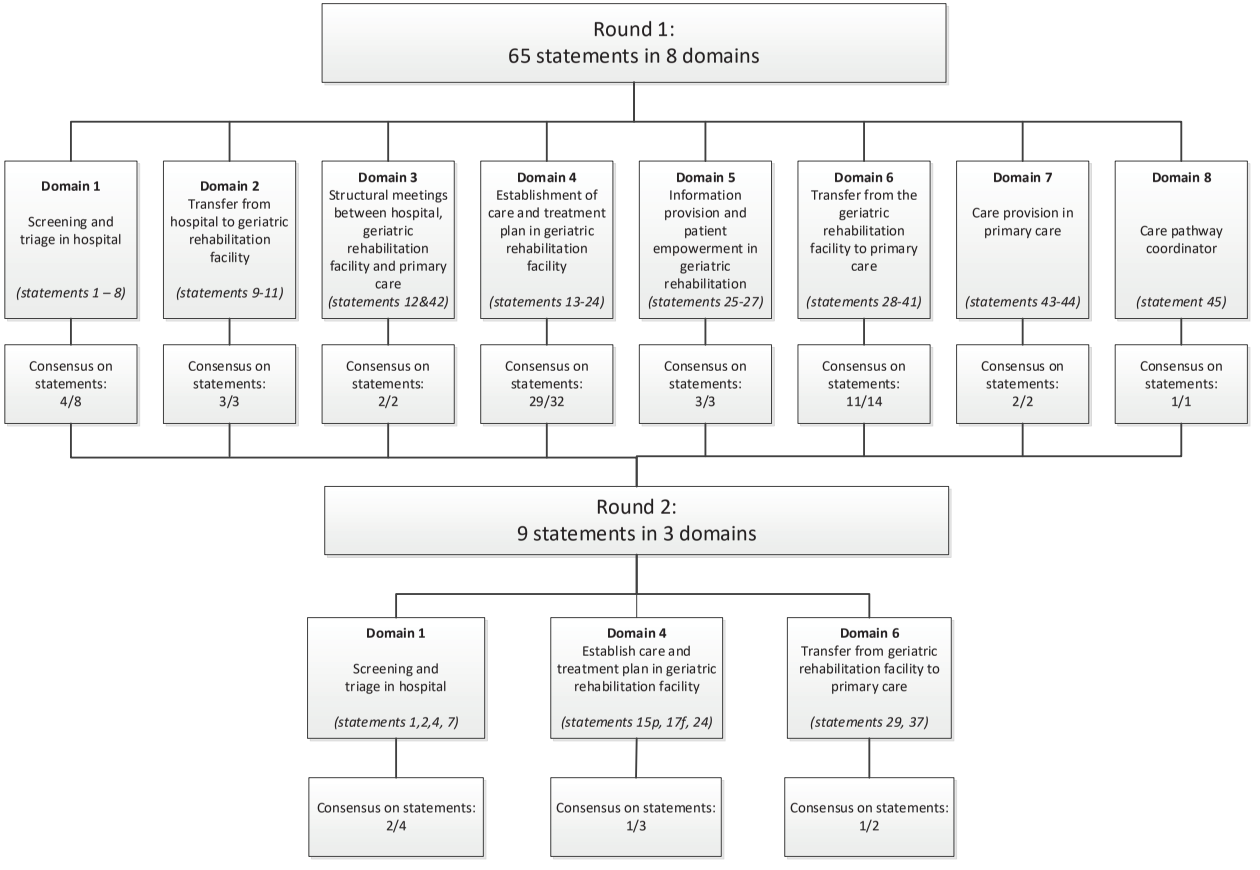

Table 2 shows all statements of the pathway, together with how these statements were valued by the experts and the additional remarks that were provided most frequently.
The final integrated care pathway consists of the statements that reached consensus about including the statement in the pathway (depicted in Table 2 as 'Consensus: Include'; n=53 statements). These statements had an IQR ≤1 and a median score of 4 or 5 (agree or completely agree), or a median of 3 (neutral), but more participants agreed with the statement (scoring a 4 of 5), in comparison with the number of participants who disagreed with the statement (scoring a 1 or 2). The statements that reached consensus (IQR ≤1) about excluding the statement were removed from the pathway (depicted in Table 2 as 'Consensus: Exclude'; n=7). These statements had a median score of 1 or 2 (disagree or completely disagree) or a median score of 3 (neutral), but more participants disagreed with the statement (scoring a 1 or 2), in comparison with the number of participants who agreed with the statement (scoring a 4 or 5). Finally, the statements that did not reach consensus (IQR>1) were also excluded from the pathway (depicted in Table 2 as 'No consensus: Exclude'; n=5).

Table 2. Experts' Opinion Regarding Inclusion and Exclusion of Statements in the Pathway and Additional Comments

No.	Statement	Decision	Comment
	Domain 1: Screening and triage in the hospital		
1	The geriatric rehabilitation triage should always be performed by an elderly care physician.	No consensus: Exclude	*"This could also be delegated"/ "Decision should be taken by the elderly care physician"*
2	The geriatric rehabilitation triage can also be performed by a professional who is responsible for arranging follow-up care after hospital discharge, presupposing the elderly care physician has the final responsibility.	No consensus: Exclude	*"No, other professionals lack sufficient knowledge"/ "Only for the not so complex patients"*
3*	To be able to adequately execute the geriatric rehabilitation triage, professionals in the hospital (specialists, allied healthcare professionals or nurses) should always be asked for additional patient information.	Consensus: Include	*"Only if the information available in registration systems is insufficient"*
4	To be able to adequately execute the geriatric rehabilitation triage, the general practitioner or home care professionals in primary care should always be asked for additional patient information.	Consensus: Exclude	*"Depends on the situation but usually this is not necessary"*
5*	The patient's wishes and possibilities should always explicitly be taken into account when giving advice about suitable follow-up care.	Consensus: Include	*"Patients should be motivated, but taking into account all preferences is not realistic"*
6*	The informal caregiver should be asked about his/her possibilities for providing informal care.	Consensus: Include	*"This is what we aim for but not something we can always take into account"*
7*	The person doing the triage for geriatric rehabilitation should always provide oral and written information about geriatric rehabilitation to the patient and informal caregiver.	Consensus: Include	*"Information should be provided but not necessarily by the person doing the triage"*
8*	A case manager should be appointed who follows the patients throughout the whole trajectory of hospital care, geriatric rehabilitation care and primary care and who serves as the point of contact for both the patient and the informal caregiver.	Consensus: Include	*"Good idea but funding might be a problem"* "Not required for all patients"
	Domain 2: Transfer from hospital to geriatric rehabilitation facility		
9*	If the triage shows that the patient is eligible for geriatric rehabilitation, the patient should have at least one day to prepare themselves for the transfer to the geriatric rehabilitation facility.	Consensus: Include	*"It is important to start with the rehabilitation trajectory as soon as possible"*

No.	Statement	Decision	Comment
10*	On the day the patient is discharged from the hospital, an actual medication list, a medical and nursing discharge summary and, if necessary a discharge summary from allied health care professionals, should be available for the professionals in geriatric rehabilitation.	Consensus: Include	*"Preferably even earlier"*
11*	If the patient discharge summaries are not available on the day the patient is admitted in the geriatric rehabilitation unit, professionals from the geriatric rehabilitation facility should contact the hospital directly.	Consensus: Include	*"Agree, but this does involve placing the burden on the professionals from the geriatric rehabilitation facility"*
	Domain 3: Structural meetings between hospital, geriatric rehabilitation facility and primary care		
12*	At least twice per year a meeting is organized between professionals from the hospital and from geriatric rehabilitation who are involved in the triage process. The aim of this meeting is to evaluate whether or not the triage process, the handovers and the transfer of patients between hospital and geriatric rehabilitation are satisfactory.	Consensus: Include	"Very important and preferably even more often"
	Domain 4: Establishment of care and treatment plan in geriatric rehabilitation facility		
13*	It is essential that all patients with complex health problems admitted to the geriatric rehabilitation facility are systematically and multidisciplinary examined on admission.	Consensus: Include	
14*	The examination should be performed within two weeks after the patient is admitted to the geriatric rehabilitation facility.	Consensus: Include	*"Preferably even sooner than within 2 weeks"*
15	How do you assess the importance of using the following instruments to examine patients with complex health problems on admission to the geriatric rehabilitation unit?		*"The choice of instruments should be based on indication"* *"Not familiar with all instruments"*
a*	Barthel Index (BI)	Consensus: Include	
b*	Groningen Activity Restriction Scale (GARS)	Consensus: Include	
c*	Timed Up & Go test (TUG)	Consensus: Include	
d*	Elderly Mobility Scale (EMS)	Consensus: Include	
e*	Modified Iowa Level of Assistance Scale (MILAS)	Consensus: Include	
f*	Berg Balance Scale (BBS)	Consensus: Include	
g*	Utrecht Scale for Evaluation of Rehabilitation (USER)	Consensus: Include	
h*	Mini Mental State Examination (MMSE)	Consensus: Include	
i*	Neuropsychiatric Inventory (NPI)	Consensus: Include	
j*	Delirium Observation Screening (DOS)	Consensus: Include	
k*	Geriatric Depression Scale (GDS)	Consensus: Include	
l	Care Dependency Scale (CDS)	Consensus: Exclude	

No.	Statement	Decision	Comment
m*	Braden Scale (pressure sores)	Consensus: Include	
n*	Short Nutritional Assessment Questionnaire (SNAQ)	Consensus: Include	
o	Mini Nutritional Assessment – Short Form (MNA-SF)	Consensus: Exclude	
p*	Frailty Scales, such as the Groningen Frailty Indicator (GFI), Tilburg Frailty Indicator (TFI), or the Transmural Care Assessment Geriatrics (TRAZAG)	Consensus: Include	
16*	Every patient with complex health problems should get a professional appointed who acts as a first responsible professional for the patient (such as a care professional, a nurse or an allied healthcare professional).	Consensus: Include	
17	How do you assess the suitability of the following care professionals to act as a first responsible professional?		
a*	Healthcare helper level 3	Consensus: Include	
b*	Healthcare worker level 4	Consensus: Include	
c*	Bachelor-educated registered nurse	Consensus: Include	
d	Physiotherapist	Consensus: Exclude	
e	Occupational therapist	Consensus: Exclude	
f	Social care worker	No consensus: Exclude	
18*	A multidisciplinary meeting between professionals should be organized around a patient within two weeks after admission to the geriatric rehabilitation facility.	Consensus: Include	"Preferably even earlier"
19*	Prior to the first multidisciplinary meeting, the first responsible professional should have discussed wishes and possibilities concerning the care and treatment plan and rehabilitation goals with the patient and (if the patient desires) with the informal caregiver.	Consensus: Include	*"This enables us to incorporate the patient's voice into the multidisciplinary meeting"*
20*	After each multidisciplinary meeting, the patient and (if applicable) the informal caregiver should always be informed about the issues discussed during the meeting.	Consensus: Include	
21	The patient and (if the patient desires) the informal caregiver should always be present during the multidisciplinary meetings where rehabilitation progress is discussed.	Consensus: Exclude	*"Infeasible and inefficient"*
22*	When establishing a patient's treatment program, attention should be paid to the examination of the patient at admission, their wishes and possibilities and (if applicable) the possibilities of the informal caregiver to provide informal care.	Consensus: Include	*"If possible, yes with an emphasis on possibilities rather than wishes"*
23*	Within two weeks after admission the patient's provisional discharge date should be discussed with the patient and (if applicable) the informal caregiver.	Consensus: Include	*"Sometimes more than 2 weeks are required to establish the discharge date"*

No.	Statement	Decision	Comment
24	All patients should be discussed at least every two weeks in a multidisciplinary meeting for professionals.	No consensus: Exclude	*"The frequency depends on the progress of individual patients"*
	Domain 5: Information provision and patient empowerment in geriatric rehabilitation		
25*	The treatment intensity (the number of hours of treatment per week) should be modified if this is required by the patient's progress.	Consensus: Include	"Taking the funding possibilities into account"
26*	The patient's provisional discharge date should be adjusted if this is required by the patient's progress.	Consensus: Include	
27*	In the geriatric rehabilitation facility, specific attention should be paid to patient self-management.	Consensus: Include	
	Domain 6: Transfer from the geriatric rehabilitation facility to primary care		
28*	At the latest one week prior to discharge from the geriatric rehabilitation facility, the discharge conversation with the patient should be organized.	Consensus: Include	"This depends on how complex the situation of the patient is: could be earlier or later"
29	The home situation of the patient should be visited by a physiotherapist or occupational therapist well before discharge, to give advice about necessary adjustments	No consensus: Exclude	*"Home visit is not always needed"*
30*	Physiotherapist or occupational therapist should advise the patient prior to discharge from the geriatric rehabilitation facility about required adjustments to the home which must be undertaken to go home safely.	Consensus: Include	
31*	Prior to discharge from the geriatric rehabilitation facility, the professionals of the geriatric rehabilitation facility should arrange home care at the home care organization of the patient's preference.	Consensus: Include	
32*	If the complexity of the situation requires it, a home care professional should come to the geriatric rehabilitation facility for a patient intake.	Consensus: Include	"Good informed home care is crucial for continuity of care"
33*	If required by the patient, a home care professional should come to the geriatric rehabilitation facility for a patient intake.	Consensus: Include	*"Doing an intake at home might be more valuable"*
34*	The medical discharge summary and the actual medication list should be sent to the general practitioner no later than on the discharge day.	Consensus: Include	*"Not always necessary for the medical discharge summary: if the situation is not complex, 5 days is sufficient"*
35*	The prescription for medication should be sent to the pharmacy no later than on the discharge day.	Consensus: Include	*"Preferably even earlier"*
36*	The discharge summaries of allied healthcare professionals should always be given to the patient no later than on the discharge day.	Consensus: Include	

No.	Statement	Decision	Comment
37*	During the discharge conversation, the medication list should always be meticulously discussed with the patient and family.	Consensus: Include	*"Not only when the patient is discharged but always when the medication changes"*
38*	The discharge summary to the general practitioner should always include information about the follow-up care advised.	Consensus: Include	
39	In addition to the written discharge summary, the elderly care physician should always provide an oral handover to the general practitioner.	Consensus: Exclude	*"This is unrealistic and leads to double work"*
40*	The nursing discharge summary should be transferred to the organization providing follow-up care no later than on the discharge day.	Consensus: Include	
41*	If the patient discharge summaries are not available on the day of discharge from the geriatric rehabilitation facility, professionals in primary care (general practitioners and home care professionals) should contact the geriatric rehabilitation facility directly.	Consensus: Include	"If the situation requires this"
	Domain 3: Structural meetings between hospital, geriatric rehabilitation facility and primary care		
42*	At least twice per year a meeting should be organized between professionals from the geriatric rehabilitation facility and from primary care to evaluate the patient discharge summaries and patient transfer.	Consensus: Include	*"Good idea but difficult to organize with the large number of GPs and primary care organizations"*
	Domain 7: Care provision in primary care		
43*	The general practitioner should always contact the patient within a week after returning home to safeguard the health status of the patient.	Consensus: Include	*"Depends on the complexity of the situation"*
44*	The GP-based nurse specialist or district nurse of the home care organization should act as the patient's case manager after discharge from the geriatric rehabilitation facility.	Consensus: Include	*"Depends on how frail the person is"*
	Domain 8: Care pathway coordinator		
45*	A care pathway coordinator should be appointed, acting as a link between the healthcare professionals of the various organizations. This person also safeguards that the agreements in the care pathway are followed.	Consensus: Include	*"Improves quality but not always necessary"*

The seven statements that did not gain consensus about exclusion were excluded from the pathway. The first of these seven statements was "To be able to adequately execute the geriatric rehabilitation triage, the general practitioner or home care professionals in primary care should always be asked for additional patient information" (statement 4). Experts commented that in general, sufficient information for the triage decision could be retrieved by sources in the hospital and by asking the patient him/herself. The importance of using the "Care Dependency Scale (CDS)" (statement 15-l) and the "Mini Nutritional Assessment – Short Form (MNA-SF)" (statement 15-o) to examine patients with complex health problems at admission within the geriatric rehabilitation unit were assessed as "not important" and were therefore also eliminated. Furthermore, physiotherapists and occupational therapists were assessed as unsuitable to act as the first responsible professional for the patient (statement 17-d and 17-e) and were therefore to be removed from the final list as well. With regard to these above mentioned four statements (15-l, 15-o, 17-d and 17-e), the experts did not provide additional remarks to explain their negative choices. The statement "The patient and (if the patient desires so) the informal caregiver should always be present during the multidisciplinary meetings where rehabilitation progress is discussed" (statement 21) was also excluded from the pathway. Experts commented that involving the patient and informal caregiver in the multidisciplinary meetings is not feasible and would lead to inefficiency and needless discussions. They preferred to inform the patient after the multidisciplinary meeting. Finally, the experts agreed on eliminating the statement "Next to the written discharge summary, the elderly care physician should always provide an oral handover to the general practitioner" (statement 39). They stated that duplication of work should be prevented and that this is needed only when there are peculiarities.

The five statements that did not gain consensus were also eliminated. These were the following: "The geriatric rehabilitation triage should always be performed by an elderly care physician" (statement 2), and "The geriatric rehabilitation triage can also be performed by a professional who is responsible for arranging follow-up care after hospital discharge, presupposing the elderly care physician has the final responsibility" (statement 3). Some elderly care physicians stated that care providers other than themselves did not have the clinical expertise to take this triage decision, whereas others argued that the criteria about eligibility for geriatric rehabilitation were clear enough for other care providers to make this decision.
Furthermore, no consensus was reached on the statements "A social care worker is suitable as a first responsible professional for the patient" (statement 17-f)" and "All patients in the geriatric rehabilitation facility should be discussed at least every two weeks in a multidisciplinary meeting for professionals" (statement 24). Some experts argued that every two weeks was too often, and some experts stated that patients should be discussed every week. Finally, the statement "The home situation of the patient should always be visited by a physiotherapist or occupational therapist well before

discharge to give advice about necessary adjustments" (statement 29) did not reach consensus, as some experts highly agreed with this statement, while others argued that photos of the home situation or information from the patient him or herself is also sufficient to give advice about the essential adjustments. Accordingly, these statements were also eliminated.

Discussion

Through a two-round Delphi procedure involving elderly care physicians specialized in geriatric rehabilitation, this study identified a set of consensus-based statements which should be incorporated in an integrated care pathway for geriatric rehabilitation. The results showed that consensus was gained for 60 out of 65 (sub)statements (92%). Of these 60 (sub)statements, the experts assessed the content of 53 statements as relevant for inclusion in the pathway. Seven of the other statements were considered insufficiently relevant to be incorporated in the pathway, and no consensus was reached on five statements. These results imply that there is broad consensus on the content and structure of the pathway and that it has the potential to be disseminated and implemented on a wider scale.

The starting point of this modified Delphi procedure was the pathway developed in the southern part of the Netherlands by professionals involved in the provision of care within the pathway and by representatives of patients and informal caregivers. The content of the pathway was therefore already well adjusted to current practice in geriatric rehabilitation. Furthermore, the pathway covers transmural care between various settings (hospital, geriatric rehabilitation and primary care). This is in line with current developments in integrated care, where the emphasis is on making services, providers and organisations work together and improving continuity for the client.[20]

To our knowledge, no other study has used a Delphi method to reach consensus on the content of an integrated care pathway in geriatric rehabilitation. Although some studies have made use of an expert panel to create a care pathway, these pathways are focused on one specific disorder and only on hospital care. [21, 22] Therefore, the results of our study can be considered unique.

A key factor in the successful implementation of care pathways is the flexibility of adapting the pathway to local settings.[23] This is confirmed by feedback from the experts in the present study: although consensus was reached on most of the statements of the pathway, experts provided additional remarks such as "this depends on the situation" or "not strictly always". This indicates that there is a need for flexibility.

Although this Delphi study was performed to reach consensus on the content and structure of the integrated care pathway in the Netherlands, It is likely that many elements of this care pathway are useful for other countries and healthcare systems as well. As a growing number of frail older adults receive care from multiple providers and move

across health care settings, more research focuses on how adverse events can be avoided in light of these care transitions.[24] Therefore, the specific parts of the pathway which focus on the safe transition of patients between care settings (not necessarily geriatric rehabilitation) can be used as a draft format in other countries when developing their own local pathways in geriatric rehabilitation. In addition, patient-focused care is a main objective of healthcare organisations across the world, and this pathway includes the organisation and coordination of care around patient's needs, rather than around professionals or organisations. This is demonstrated in that the settings through which patients transit are all represented in the pathway, as well as the fact that various elements of this pathway specifically focus on the provision of information and patient empowerment. This pathway may therefore help organisations internationally in realizing patient-focused care and in providing integrated care by bringing services, professionals and organisations together. As noted, it is important that organisations use this pathway only as a draft format and adapt it to their local needs and circumstances. When adapting the care pathway, a key to successful implementation is involving patients and various professionals who work with the care pathway during the stage of adaptation.

Although integrated care is patient-centred, considers the patient as a real partner and empowers the patient[25], the experts agreed to exclude statement 21,"*The patient and (if the patient desires so) the informal caregiver should always be present during the multidisciplinary meetings where rehabilitation progress is discussed".* It is therefore important to explore whether this patient-centeredness is now sufficiently considered in the multidisciplinary meetings.

One of the concerns expressed by the experts was about the feasibility of some statements which are included in the final pathway. These concerns were mainly based on expected financial constraints. Examples of these statements are appointing a case manager who follows the patient throughout the whole trajectory of hospital care, geriatric rehabilitation care and primary care (statement 8) and changing the treatment intensity if this is required by the patient's progress (statement 25). Experts argued that they are sceptical whether this will actually be accomplished. Second, the experts acknowledged that they were not familiar with all screening instruments they had to assess (statement 15). Therefore, there is still some uncertainty as to which screening instruments should be used when examining patients at admission, and which screening instruments may be redundant.

A strength of this study is that the design assured the experts' anonymity to one another, avoiding group conformity. Furthermore, the majority (70%) of the experts participating in the Delphi panel had more than 10 years of working experience in geriatric rehabilitation, which enabled them to make a competent assessment of the importance of the statements.

Three limitations should also be mentioned. First, in a Delphi study, panellists do not meet, which prevents the possibility of interaction and creating new ideas.[26] Second, the response rate was only 46%. Although a systematic review by Boulkedid and colleagues[27] showed that only 39% of the Delphi studies on healthcare quality indicators report on response rate, the median response rate among these studies is 90% in the first round. Therefore, selection bias is possible in our study, if the non-respondents had different opinions regarding the content of the care pathway. Furthermore, the expert panel was a rather homogeneous group; they all worked in the geriatric rehabilitation facility. Professionals from hospitals and primary care were not represented in this panel. Although this was a considered decision as we reasoned that elderly care physicians have wide knowledge about and experience with the different settings in the whole rehabilitation trajectory, whereas representatives from the hospital or primary care might not have a complete view of all settings, this choice might have affected the external validity of our results. Still, because the integrated care pathway was developed by three multidisciplinary workgroups with a wide variety of professionals involved, we believe the multidisciplinary character of the pathway has been sufficiently accounted for. It is recommended in future research to also explore opinions of other involved professionals about the content of the integrated pathway in geriatric rehabilitation.

Conclusion

To conclude, a set of 53 out of 65 elements was found to be appropriate for inclusion in the integrated care pathway for geriatric rehabilitation. There is a need to further explore experts' ideas on statements that did not gain consensus and to examine if they could be incorporated in the pathway in a modified form. As there is a growing interest in improving care transitions among older adults and avoiding adverse events in light of these transitions both nationally and internationally, the pathway has the potential to be disseminated and implemented on a wider scale. Furthermore, future research should focus on the feasibility of the integrated care pathway in daily practice. If it appears that certain elements of the pathway are not feasible in practice, the pathway should be adjusted accordingly. Finally, the (cost-) effectiveness of implementing the pathway in regular care is currently being evaluated.

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5

PROCESS EVALUATION OF AN INTEGRATED CARE PATHWAY IN GERIATRIC REHABILITATION FOR PEOPLE WITH COMPLEX HEALTH PROBLEMS

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Abstract

Background: An integrated care pathway in geriatric rehabilitation was developed to improve coordination and continuity of care for community-living older adults in the Netherlands, who go through the process of hospital admission, admission to a geriatric rehabilitation facility and discharge back to the home situation. This pathway is a complex intervention and is focused on improving communication, triage and transfers of patients between the hospital, geriatric rehabilitation facility and primary care organisations. A process evaluation was performed to assess the feasibility of this pathway.

Methods: The study design incorporated mixed methods. Feasibility was assessed thru if the pathway was implemented according to plan (fidelity and dose delivered), (b) if patients, informal caregivers and professionals were satisfied with the pathway (dose received) and (c) which barriers and facilitators influenced implementation (context). These components were derived from the theoretical framework of Saunders and colleagues. Data were collected using three structured face-to-face interviews with patients, self-administered questionnaires among informal caregivers, and group interviews with professionals. Furthermore, data were collected from the information transfer system in the hospital, patient files of the geriatric rehabilitation facility and minutes of evaluation meetings.

Results: In total, 113 patients, 37 informal caregivers and 19 healthcare professionals participated in this process evaluation. The pathway was considered largely feasible as two components were fully implemented according to plan and two components were largely implemented according to plan. The timing and quality of medical discharge summaries were not sufficiently implemented according to plan and professionals indicated that the triage instrument needed refinement. Healthcare professionals were satisfied with the implementation of the pathway and they indicated that due to improved collaboration, the quality of care provision improved. Although patients and informal caregivers were also satisfied with the care provision in the pathway, they indicated that the care organisations involved should pay more attention towards providing information about their treatment.

Conclusions: This process evaluation showed that patients, informal caregivers and professionals are fairly satisfied with the care provision in the pathway and professionals reported that collaboration improved. Extra attention should be paid to the components in the pathway that were not implemented according to plan.

Background

After hospital discharge, a growing number of older patients are temporarily admitted to an inpatient geriatric rehabilitation facility, where they receive short-term multidisciplinary care to improve physical function, independence and self-care, and to increase or restore participation.[1] A systematic review showed that geriatric rehabilitation indeed has beneficial effects for functional improvement, prevents admissions to nursing homes, and reduces mortality.[2] However, when older adults go through the full trajectory of hospitalisation, admission to a geriatric rehabilitation facility and discharge back to the home situation, they face various challenges.[3] First, because patients transit between care settings, they are confronted with different caregivers, which may threaten continuity of care.[4] Second, transitions in care can lead to problems such as ineffective discharge planning and miscommunication between care providers, patients and informal caregivers.[5] Finally, incomplete discharge information may negatively affect quality of care and patient safety and potentially cause adverse events such as hospital readmission, permanent admission to nursing homes, or even death.[6,7] To achieve optimal geriatric rehabilitation care, these challenges in continuity and coordination of care need to be addressed.[7]

Accordingly, to meet these challenges, an integrated pathway in geriatric rehabilitation was developed in the Maastricht area (southern part of the Netherlands) in the period 2012-2014 for older adults with complex health problems. This pathway is focused on improving communication, triage and transfers of frail older patients between the hospital, geriatric rehabilitation facility and primary care organisations.

Integrated care pathways have traditionally been based on specific conditions in the hospital setting, for example hip fracture.[8,9] Nowadays, an increasing number of pathways have been developed which focus on the transition of frail older adults and cross the boundaries of care settings. These pathways focus on improving continuity and coordination of care within and between care settings.[10-14] To our knowledge, no integrated care pathway has yet been developed for patients who transfer between more than two settings; therefore this integrated care pathway was developed. This pathway is a complex intervention, targeting multiple interacting components, such as organisational structures, healthcare professionals in various settings, patients and informal caregivers. This makes the implementation a challenging process.[15] To be able to draw conclusions about the feasibility of the pathway, an extensive process evaluation was carried out. The results of this process evaluation are presented in this study. Feasibility was examined by assessing several aspects of the implementation process which were relevant and assessable for the current evaluation, based on the framework laid out by Saunders and colleagues.[16] This is a framework often used for process evaluations of innovations in health care.[17-19] The process factors that were assessed were 1) the extent to which the pathway was implemented as planned (fidelity and dose delivered); 2)

the extent to which patients, informal caregivers and healthcare professionals were satisfied with the pathway (dose received - satisfaction), and 3) the influence of external factors (barriers and facilitators) on the implementation of the pathway (context).

Methods

Integrated care pathway in geriatric rehabilitation

The pathway was developed using a bottom-up approach. Through literature research and through consultation with experts and care providers, current practice, barriers and incentives for change were systematically analysed. Based on this analysis, three multidisciplinary working groups of patient representatives, informal caregivers and professionals discussed how current care delivery could be optimised. This resulted in concrete proposals for improvement which were critically discussed in all working groups. These proposals were finally combined and included in the integrated care pathway. The development of the pathway is described elsewhere.[3] The pathway consists of 31 specific elements (Appendix 1); five core components can be distinguished. These five core components are:

1. A care pathway coordinator is appointed. The role of the care pathway coordinator is to act as a port of call for professionals involved in the pathway, to improve communication between professionals from different settings, improve continuity and coordination of care and to further streamline the pathway.
2. A triage instrument (Appendix 2) is introduced to be used by discharge nurses in the hospital. This instrument is based on a triage instrument developed by the expert opinion of the Dutch association of elderly care physicians (Verenso).[20] The instrument instructs discharge nurses to gather information on each patient regarding their functional prognosis, endurability, teachability/trainability and both the patient's and informal caregiver's needs and abilities. This information should enable the users of the instrument to decide if geriatric rehabilitation is appropriate for a patient or not. If the discharge nurse has doubts about the appropriateness of geriatric rehabilitation for a patient, an elderly care physician from the geriatric rehabilitation facility should be consulted.
3. Patients and their informal caregivers are always actively involved in the triage decision in the hospital, in the establishment of their care and treatment plan in the geriatric rehabilitation facility and in primary care.
4. All patient discharge summaries (medical and nursing) from the hospital to the geriatric rehabilitation facility and from the geriatric rehabilitation facility to primary care professionals are sent no later than on the day of discharge and should be of high quality.

5. Evaluation meetings between care professionals from the hospital and the geriatric rehabilitation facility are organised at least twice a year, and between the geriatric rehabilitation facility and primary care professionals at least once a year. These meetings should focus on improving the triage process, the timing and quality of discharge summaries and the (quality of the) transfer of patients between the hospital, geriatric rehabilitation facility and primary care.

Design

This process evaluation used a design incorporating mixed methods, including both qualitative and quantitative data collection methods. Process data were gathered alongside a prospective cohort study on the effects of the pathway. The results of this study of effects will be published elsewhere.
This study design and methods were approved by the Medical Ethics Committee of the University Hospital Maastricht (#11-4-020).

Setting and participants

This study was conducted in a university hospital, a geriatric rehabilitation facility (which in the Netherlands are usually situated in a nursing home) and primary care organisations in the Maastricht area (southern part of the Netherlands). The study population of this process evaluation consisted of three groups of participants: 1) patients who received care during and after implementation of the pathway; 2) their informal caregivers; and 3) their care professionals in the hospital, the geriatric rehabilitation facility and in primary care. Patients and informal caregivers provided written informed consent and care professionals provided verbal consent for participation in this study.

Patients

In the Netherlands, four main categories of patients can be distinguished within geriatric rehabilitation: patients with stroke, patients with orthopaedic trauma, elective orthopaedic patients, and a residual group, referred to as geriatric patients with complex health problems with related functional loss and care dependency.[21] The pathway described in the present study was developed for the geriatric patients with complex health problems. This heterogeneous group of patients is often suffering from multimorbidity, mostly involving cardiac problems, respiratory problems, neurological problems and other internal medicine problems such as gastrointestinal problems. Disease exacerbations are common in this group, leading to hospital readmissions and the need for geriatric rehabilitation.
Patients were eligible for participation if they were admitted to the geriatric rehabilitation facility between April 2013 and August 2014. Furthermore, they had to have been

admitted to a hospital prior to rehabilitation in the geriatric rehabilitation facility, aged ≥ 65 years and be community-dwelling. Patients were not eligible for participation if their cognitive ability (assessed by an elderly care physician) was considered insufficient for participation in the study. A trained research assistant recruited patients by visiting all eligible patients in the geriatric rehabilitation facility and asking them if they were willing to participate in the study.

Informal caregivers

The informal caregiver was defined as the person the patient expects to be their most important informal caregiver after discharge to the home situation (e.g. a family member, friend or neighbour). The informal caregivers were recruited by asking the patients if they had an informal caregiver who could be invited to participate in the study. These informal caregivers were invited for participation by telephone.

Healthcare professionals

We included care professionals from the various settings who were involved in developing the pathway. These professionals were chosen, based on their involvement in the five key elements of the pathway. These professionals represented the three settings involved: the hospital (discharge nurses), the geriatric rehabilitation facility (elderly care physicians, nurses and physiotherapists) and primary care (specialised nurses working in the practices of general practitioners (GPs) and professionals from home care organisations).

Data collection

An experienced, trained research assistant conducted three structured face-to-face interviews with patients at admission to the geriatric rehabilitation facility, after three months, and after nine months (April 2013 - June 2015). Face-to-face interviews were chosen over written questionnaires due to the frailty level of the population. Questions were compiled for this study and evaluated the quality of care received in each setting. Informal caregivers received self-administered questionnaires in the period April 2013 - June 2015 to evaluate the care their relatives received in each setting. These questionnaires were also compiled for this study. Furthermore, semi-structured group interviews with healthcare professionals were conducted in the period February 2015 - June 2015. This method was chosen to be able to gather the most relevant information about the implementation process from the perspective of professionals. Two members of the research team (authors IHJE and JCMvH) conducted these group interviews which were focused on the extent to which professionals experienced the pathway as being implemented according to plan, whether or not professionals were satisfied with

the pathway elements and if external factors influenced the implementation process. Furthermore, data were retrospectively retrieved from the information transfer system, from patient files of the participating hospital and geriatric rehabilitation facility and from minutes of weekly meetings with the care pathway coordinator and minutes of structural evaluation meetings. Table 1 provides an overview of the data collection methods used.

Table 1. Data Collection Methods

Measurement method							
Concept	Operationalization	IP	QIC	GIP	PF	ITS	M
Implementation according to plan (Fidelity & Dose delivered)	Care pathway coordinator						X
	Triage instrument			X		X	
	Active involvement			X			
	Patient discharge summaries			X	X		
	Structural evaluation meetings			X			X
Satisfaction with the care pathway (Dose received - Satisfaction)	Healthcare professionals			X			
	Patients	X					
	Informal caregivers		X				
Barriers and facilitators influencing implementation (Context)	Barriers or facilitators influencing the role of the care pathway coordinator.						X
	Barriers or facilitators influencing the triage process.			X			X
	Barriers or facilitators influencing involvement of patients and informal caregivers.	X	X	X			
	Barriers or facilitators influencing patient discharge summaries.			X			X
	Barriers or facilitators influencing the organization and content of meetings			X			X

IP=Interviews Patient; QIC=Questionnaire Informal Caregiver; GIP = Group Interview Professionals; PF = Patient Files; ITS = Information Transfer System; M=Minutes of Meetings.

Data analysis

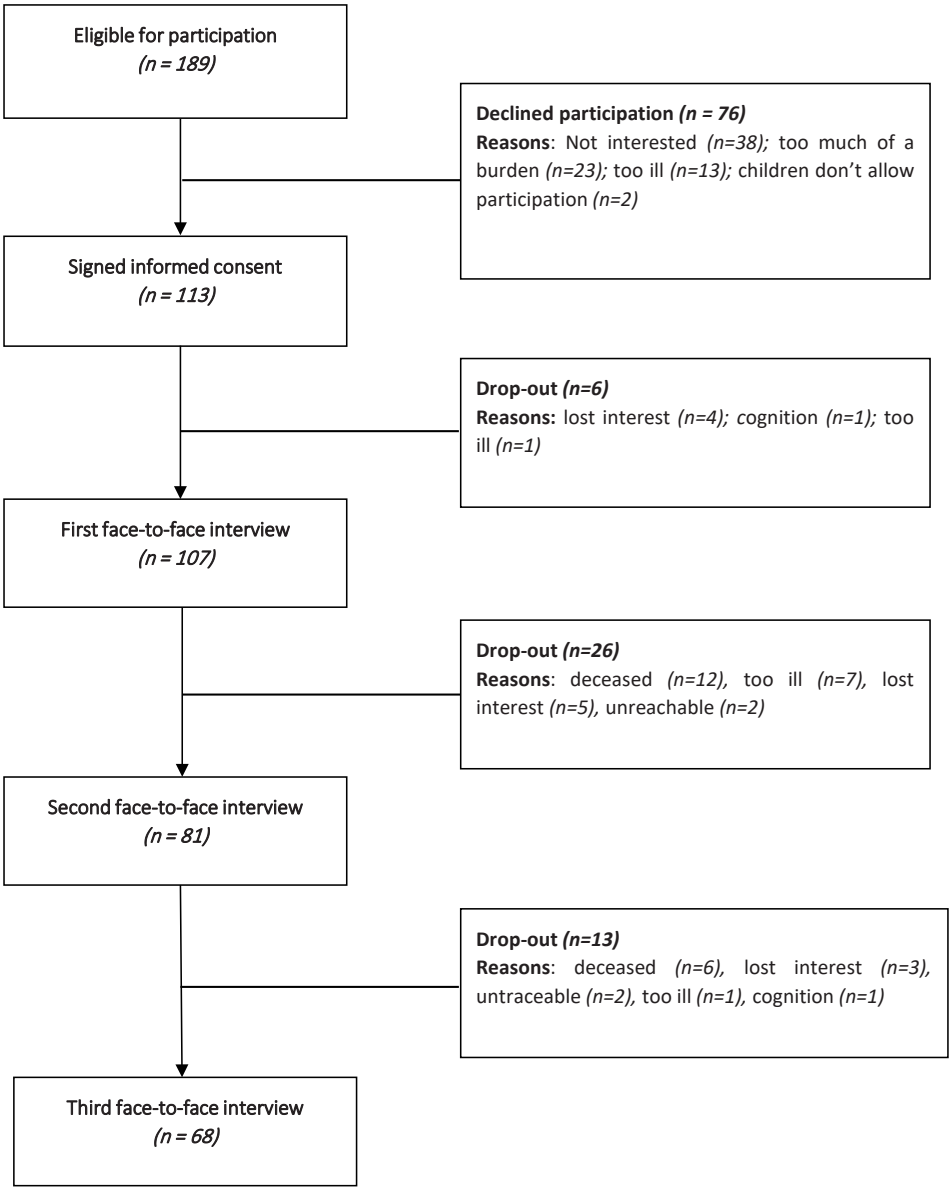
The quantitative data were analysed using the statistical software package SPSS for Windows, version 22. Descriptive statistics were used for frequencies, percentages, means and standard deviations. The continuous demographic variables were analysed using independent t-tests, whereas the ordinal data were analysed using chi square or Fisher's exact tests. The group interviews with professionals were audio-taped and transcribed by one of the authors (IHJE). The transcripts were systematically read and coded (by author IHJE), which caused major themes to emerge. These themes were linked to the theoretical components of Saunders and colleagues[16] and on the five key pathway elements of the study. Author IHJE checked in the information transfer system if the triage instrument was used for all patients and assessed the timeliness of patient discharge summaries in the patient files. Finally, author IHJE analysed the minutes of the weekly evaluation meetings of authors IHJE and JCMvH with the care pathway co-ordinator and minutes of the structural evaluation meetings between the hospital, the geriatric rehabilitation facility and primary care organisations to gather additional information on the process components.

Results

Sample

In total, 189 patients were eligible for participation. Of these 189 patients, 113 patients (60%) were willing to participate in the current study. The mean age of these patients was 81 (SD 6.9) and 32% were male. Furthermore, 69% were living alone before hospital admission and 52% assessed their health as fair or poor (as compared with excellent/very good/good). There were no significant baseline differences between the patients who dropped out of the study (n=45) and patients who completed all measurements (n=68). Figure 1 shows the flowchart of the patient study population.

Figure 1. Flowchart Patient Study Population



In relation to the 113 patients who were included in the study, 29 informal caregivers (26%) were willing and able to participate in the study. An additional 8 informal caregivers participated from the group of 76 patients who declined participation, meaning that in total 37 informal caregivers were included in the study. The main reasons for not participating were that (a) the patient indicated not having a caregiver (n=32), (b) the caregiver was not interested in participation (n=24) or (c) the patient did not want to burden the informal caregiver (n=10). The mean age of the informal caregivers was 63 years (SD 15.4), ranging from 19 to 88. The majority of the informal caregivers were female (65%). Of the informal caregivers, 54% were a daughter or son (in law), 22% were spouses, 5% a brother or sister and 19% had another relationship with the patient. In total, 21 professionals were approached to participate in this process evaluation and 19 participated in the semi-structured group interviews. Six interviews were conducted: with hospital discharge nurses (n=8), with elderly care physicians (n=2), physiotherapists (n=3) and nurses (n=3) at the geriatric rehabilitation facility, with professionals from home care organisations (n=2) and with a specialised nurse working in the GP practice (n=1).

Implementation according to plan (fidelity and dose delivered)

Care pathway coordinator

According to plan, a care pathway coordinator was included in the pathway. The role of the care pathway coordinator was also performed according to plan as the minutes taken during the feedback and evaluation meetings demonstrate that the main focus was on analysing barriers and facilitators in the delivery of care in the pathway, on discussing barriers in communication between professionals and on finding opportunities to stream the pathway further.

Triage instrument

The discharge nurses used the triage instrument for 100% of the patients who were referred from the hospital to the geriatric rehabilitation facility. The discharge nurses from the hospital reported in their group interview that they always contacted the elderly care physician when they had doubts about the eligibility of a patient for geriatric rehabilitation. However, the elderly care physicians argued that 10% of the patients admitted to the geriatric rehabilitation facility actually needed another type of follow-up care and therefore, consulting them more often would probably decrease this percentage.

Active involvement

According to the discharge nurses, elderly care physicians, nurses, home care providers and the specialised nurse of the GP practice, patients were actively informed and involved in the triage decision, in establishing their care and treatment plan and their rehabilitation goals. The professionals of the home care organisations came to the geriatric rehabilitation facility to do an intake to determine the level and type of formal homecare needed for all patients who requested this. The practice nurse stated that once patients were discharged to the home situation, they verified whether the patients received the help they needed. However, physiotherapists from the geriatric rehabilitation facility stated although they did actively involve patients in establishing rehabilitation goals, not all goals could be addressed during inpatient rehabilitation. When patients were sufficiently rehabilitated to safely return home, their additional rehabilitation goals should be tackled at home with the support of primary care physiotherapists. This is illustrated by the following quote of a physiotherapist: *"Some people indicate that they want to do groceries again. We know this cannot be a rehabilitation goal. (…) Doing groceries can be solved with assistance. If you are that far that you can do groceries yourself, you should have been discharged a long time ago."*

Furthermore, all professionals indicated that the informal caregiver was not always actively involved; only if the patient agreed to involve the informal caregiver or if this seemed essential considering the patient's cognitive problems.

Patient discharge summaries

The elderly care physicians, nurses, physiotherapists, professionals from home care organisations and the specialised nurse of the GP practice all gave a general judgement about the completeness of information and comprehensiveness (quality) of the patient discharge summaries in the group interviews, based on their own expertise. The elderly care physicians stated that the quality of the medical discharge summaries from the hospital to the geriatric rehabilitation facility varied in quality, with some summaries being quite extensive while others were rather cryptic. A quote of the elderly care physicians illustrating this is the following: *"Some discharge summaries are quite extensive while others are too concise and are of no use. Then you formally received a discharge summary but this has no added value".*

The quality of the medication lists from the hospital was evaluated as poor by the elderly care physicians, as there were incongruities between medication described in the medical discharge summary and medication described in nursing discharge summary. Both nurses in the geriatric rehabilitation facility and professionals from home care organisations were in general satisfied with the quality of the nursing discharge summary.

Table 2 presents the timing of the discharge summaries. The table shows that respectively 91% of the medical and 65% of the nursing discharge summaries from the hospital to the geriatric rehabilitation facility were sent on time. Of the geriatric rehabilitation facility to primary care, 29% of the medical and 52% of the nursing discharge summaries were sent on time.

Table 2. Timing of Transfer of Medical and Nursing Discharge Summaries

Setting	Hospital – GR*				GR – Primary care			
Type of discharge summary	Medical		Nursing		Medical		Nursing	
n=107	N	%	N	%	N	%	N	%
On time (day of discharge)	97	91	70	65	31	29	56	52
Too late (after the day of discharge)	1	1	3	3	67	62	1	1
Not received at all	6	5	5	5	4	4	5	5
Unknown (no date on the document)	3	3	29	27	-	-	38	35
Not applicable**	-		-		5	5	7	7

*GR = Geriatric rehabilitation

**Not applicable means that the patient is either deceased, readmitted in the hospital or does not need home care.

Structural evaluation meetings

The frequency of structural evaluation meetings was according to plan in 100% of the meetings and the minutes of these meetings reveal that, as intended, they were focused on providing feedback concerning the triage process and managing patient expectations, solving obstacles in the timing and quality of discharge summaries and on improving the care process. Furthermore, the people who were supposed to attend the structural evaluation meetings were indeed present: at least one representative of the organisations involved in the pathway attended each meeting.

Satisfaction with the pathway (dose received - satisfaction)

Healthcare professionals

The role of the care pathway coordinator was received as satisfactory by representatives of the geriatric rehabilitation facility and home care organisations; they stated in their interviews (where the care pathway coordinator was not present) that the care pathway coordinator succeeded in bringing the professionals from various organisations together and in initiating meetings to improve collaboration and continuity of care. Still, hospital discharge nurses felt that the collaboration and intensity of contact between the hospital and the geriatric rehabilitation facility did not change after implementation of the pathway.

Healthcare professionals from the hospital and the geriatric rehabilitation facility expressed their level of satisfaction with the triage instrument in the interviews. In general, professionals considered the use of the triage instrument as an improvement as they stated that after implementation of the triage instrument, more patients were correctly referred to the geriatric rehabilitation facility. However, professionals in both settings also stated that the triage instrument did not sufficiently discriminate for patients with cognitive problems. Although cognition is assessed in the triage instrument using the component 'teachability/trainability', professionals argued that there are no clear criteria regarding the extent to which someone needed to be teachable or trainable. This is demonstrated by the following quote of a discharge nurse: *"There are always dubious cases where the triage instrument is not conclusive. (…) Hospital physicians, discharge nurses and elderly care physicians all interpret it differently."*

Regarding satisfaction with the patient discharge summaries, the elderly care physicians argued that the medical discharge summaries from the hospital were often incomplete. The elderly care physicians also expressed dissatisfaction with the timing of their own medical summaries at the point of discharge towards primary care. Lack of time was their reason for often sending their own discharge summaries too late. The nurses from the geriatric rehabilitation facility were fairly satisfied with the quality of the nursing discharge summaries and the home care organisations were also genuinely satisfied with the combination of both oral and written discharge summaries received from the geriatric rehabilitation facility. This is illustrated by the following quote from a professional of a home care organisation: *"The information in the nursing discharge summaries we receive is always complete. (…) We never hear colleagues complain about missing information anymore, which used to be different in the past".*
The specialised nurse of the GP practice stated that although the quality and timing of discharge summaries has improved in comparison with some years ago, there were still patients who were discharged to their home without a medical discharge summary.

In their interviews, the discharge nurses and elderly care physicians expressed that they were satisfied with the content and frequency of the structural evaluation meetings between hospital and geriatric rehabilitation facility and that the meetings were valuable, as they were focused on improving the triage process and the transfer of patients between the settings. This improved mutual understanding and enabled the participants to provide constructive feedback. The professionals from the home care organisations also experienced the evaluation meetings with professionals from the geriatric rehabilitation facility as useful, not only to provide feedback on the current state of affairs but also to discuss future developments in health care.

Patients and informal caregivers

Table 3 shows to what extent patients and informal caregivers were satisfied with the care received in the hospital, in the geriatric rehabilitation facility and in primary care, and whether or not they felt that they have benefited from it. As shown in Table 3, more than 80% of the patients assessed the treatment received in all settings as excellent or good. Among informal caregivers, this percentage was more than 57%. Although in general patients were more positive than their informal caregivers, both patients and informal caregivers recognised that the treatment received in all three settings had a beneficial impact on the patient's health status.

Table 3. Satisfaction Among Patients and Informal Caregivers With the Rehabilitation Trajectory

	Setting:	Hospital		Geriatric rehabilitation		Primary care	
	Respondents:	Patients	Informal caregivers	Patients	Informal caregivers	Patients	Informal caregivers
Satisfaction with treatment received		n=101	n=28	n=74	n=25	n=60	n=15
	Excellent/good	72%	57%	84%	64%	80%	62%
	Sufficient	14%	36%	4%	24%	18%	38%
	Fair/poor	14%	7%	12%	12%	2%	0
Perceived benefit from treatment received		n=90	n=73	n=60	n=27	n=25	n=11
	Excellent/good	89%	66%	85%	72%	85%	100%
	Sufficient	4%	30%	7%	12%	7%	0
	Fair/poor	7%	4%	8%	16%	8%	0

Patients and informal caregivers were also asked whether or not they felt that their personal needs and wishes were sufficiently taken into account in the hospital, in the geriatric rehabilitation facility and in primary care (table 4). A substantial percentage of informal caregivers were not satisfied with the extent to which their personal needs and wishes were taken into account in the hospital (43%) and with the information provided regarding care and treatment in the hospital (36%) and primary care (40%). More specifically, they were not satisfied due to a lack of communication from professionals towards the patient and the family, and because there was insufficient personal attention paid towards the patient.

Table 4. Patients and Informal Caregivers' Experience With Involvement in Decision-Making

	Setting	Hospital		Geriatric rehabilitation		Primary care	
	Respondents	Patients	Informal caregivers	Patients	Informal caregivers	Patients	Informal caregivers
		n=85	n=28	n=72	n=25	n=58	n=15
Personal needs and wishes taken into account	Excellent/good	71%	39%	87%	44%	81%	33%
	Sufficient	13%	18%	6%	28%	16%	40%
	Fair/poor	16%	43%	7%	28%	3%	27%
		n=98	n=28	n=75	n=25	n=56	n=15
Information provided about care and treatment	Excellent/good	65 %	28%	76%	40%	80%	40%
	Sufficient	9%	36%	8%	40%	11%	20%
	Fair/poor	26%	36%	16%	20%	9%	40%
				n=86	n=26		
Involvement in establishing rehabilitation goals	Excellent/good	na	na	77%	31%	na	na
	Sufficient	na	na	8%	42%	na	na
	Fair/poor	na	na	15%	27%	na	na

Barriers and facilitators influencing implementation (Context)

The external factors facilitating the implementation of the pathway can be categorised into barriers and facilitators and were related to the professional, organisational and political contexts. A facilitator related to the professional context was higher management's support with the changes required, as minutes revealed that they had committed themselves to the changes proposed by the care pathway. Furthermore, minutes of the weekly meetings with the care pathway coordinator revealed that the independence of the care pathway coordinator was appreciated in her role as a facilitator. Because she was not employed at one of the organisations involved, she could be highly critical about the processes in all organisations and could freely propose changes. Professionals of the home care organisations reported that meetings between themselves and nurses of the geriatric rehabilitation facility were an organisational facilitator. During these meetings, the professionals worked together to improve the content of the nursing discharge summary, resulting in a new discharge summary of higher quality. Finally, the legislative changes in 2013, when the heretofore fully nationally insured geriatric rehabilitation came under a new health insurance modality, were considered to be a facilitator in implementing the pathway related to the political context. Professionals from the hospital and the geriatric rehabilitation facility stated that the changes enforced stricter admission rules for geriatric rehabilitation and therefore, the need to apply the new triage rules was more pressing.

Barriers of the implementation process were related to the innovation (the pathway) and to the organisational context. A barrier related to the innovation (the pathway) was that the triage instrument was not 100% conclusive, resulting in disagreements be-

tween professionals from the geriatric rehabilitation facility and the hospital about the referral of specific patients.
The spread of patients all over the hospital and thus the high number of professionals involved in the pathway was regarded as an important organisational barrier to successful implementation, as it was impossible to actively involve all professionals. Finally, the spread of professionals over different locations (hospital, geriatric rehabilitation facility and primary care organisations) made it difficult to organise structural evaluation meetings where all representatives could be present.

Discussion

The integrated care pathway consists of five core components: 1) the appointment of a care pathway coordinator; 2) the use of a triage instrument by discharge nurses in the hospital; 3) the active involvement of patients and their informal caregivers; 4) the timeliness and high quality of patient discharge summaries and 5) the organisation of structural evaluation meetings between the hospital, the geriatric rehabilitation facility and primary care.
The process evaluation of this pathway revealed that the pathway was largely feasible. When answering the first research question, to what extent has the pathway been implemented according to plan (fidelity and dose delivered), we can conclude that the appointment of a care pathway coordinator and the organisation of structural evaluation meetings between care professionals were fully implemented according to plan. The use of a triage instrument by the discharge nurses under the responsibility of an elderly care physician and the active involvement of patients and informal caregivers were partly implemented according to plan. Finally, the timeliness and quality of the medical discharge summaries has not sufficiently been implemented according to plan, as the quality of medical discharge summaries was rather variable and a large percentage of medical discharge summaries from the geriatric rehabilitation facility to primary care were sent too late.
When it comes to answering the second research question, to what extent were patients, informal caregivers and healthcare professionals satisfied with the pathway (dose received – satisfaction), we can conclude that patients were fairly satisfied with their rehabilitation trajectory, as more than 70% of the patients appraised the treatment received in the hospital, the geriatric rehabilitation facility and primary care as excellent or good. Furthermore, more than 84% of all patients mentioned that they benefited (very) much from the treatment received in the three previously mentioned settings. Still, as mentioned before, more consideration should be given to providing information about the treatment. Healthcare professionals were satisfied with the pathway components and indicated that due to the pathway's implementation, both the contact and communication between professionals improved, resulting in improved

continuity of care. Finally, in the third research question, the influence of professional, social, organisational and political factors was assessed and it appeared that mainly the political context was a facilitator in implementing the pathway.

This pathway is a unique programme for older adults and the healthcare professionals who care for them. Where most integrated care programmes only focus on the hospital and/or primary care, [14,22,23] this pathway includes geriatric rehabilitation as well. Experiences with such a pathway have not previously been described. Furthermore, very few studies of integrated care interventions across the hospital – primary care continuum performed a detailed process evaluation.[24] A study by Rosstad and colleagues showed that the pathways improved collaboration between professionals but that implementation was demanding and required a lot of work.[24] A study focusing on providers' perceptions of delivering integrated care found that professionals' bottom-up involvement during implementation is key to success.[25] Although the interventions implemented in both studies were different from our integrated care pathway, these findings are in line with the results of our evaluation.
We used the conceptual framework of Saunders and colleagues to assess different aspects of the pathway's feasibility and data was collected from multiple data sources which enabled comprehensive evaluation of the pathway. By collecting data from patients, informal caregivers, professionals from different settings and also from databases, the overall view on feasibility is fairly complete and the possibility of bias is reduced.

Limitations

Some limitations of this study should also be mentioned. First, not all five core components of the pathway could be assessed objectively. It was difficult to measure whether or not patients and informal caregivers were actively involved because 'active involvement' is difficult to define and to assess. The same holds for the word 'doubt' when assessing if elderly care physicians were always consulted when there was doubt about eligibility for geriatric rehabilitation during triage.
Second, the timeliness of discharge summaries could not be assessed in all cases because the date when the discharge summary was received could not always be verified. Neither was it possible to assess the timeliness of medication lists and the physiotherapeutic discharge summaries because the medication lists were not sent directly to the geriatric rehabilitation facility, but first to the pharmacy, and also because it was not clear how many patients had visited a physiotherapist in the hospital and how many patients had not. Third, the discharge nurses, the elderly care physicians, the professionals from home care organisations and the specialised nurse of the GP practice had already been actively involved in developing the pathway. Therefore, their answers might have been different from professionals who provide care along the pathway but

who had not been involved in this development. Fourth, only a small number of informal caregivers were interested in participating in the study (n=37), which could have led to non-response bias if these participants are not representative of the whole group of informal caregivers. Finally, all participants – patients, informal caregivers and professionals - might have given socially desirable answers. We tried to avoid this by stressing among patients that their answers would be treated confidentially and that study participation would not affect their (right to) healthcare services. Professionals were assured that the interviews were conducted in order to assess the effects of the pathway, not to criticise their competencies.

Conclusions

Based on the results of this process evaluation it seems that the pathway as we have designed it is largely feasible. Professionals are fairly satisfied with the content of the pathway and with the extent to which the pathway is used in regular care. However, special attention should be paid to four aspects. First, we recommend critical revision of the cognition component (teachability/trainability) in the triage instrument and also developing clearer admission criteria for patients with cognitive problems. This should make the triage process more transparent. Second, we recommend improving the provision of information in the hospital, the geriatric rehabilitation facility and in primary care to both informal caregivers and to patients about their treatment. Third, the quality and timing of medical discharge summaries from the hospital to the geriatric rehabilitation facility and from the geriatric rehabilitation facility to primary care should be improved. We recommend initiating this by organising one or more meetings between physicians from the hospital, the geriatric rehabilitation facility and primary care. During these meetings, they should discuss which information is needed in the discharge summaries and what timing is necessary to safely provide follow-up care. The possibilities of using technology when transferring discharge summaries could also be explored. Finally, as professionals in the pathway work in different areas, digital resources (such as videoconferencing) could also facilitate the organisation of structural evaluation meetings and this option should be explored.

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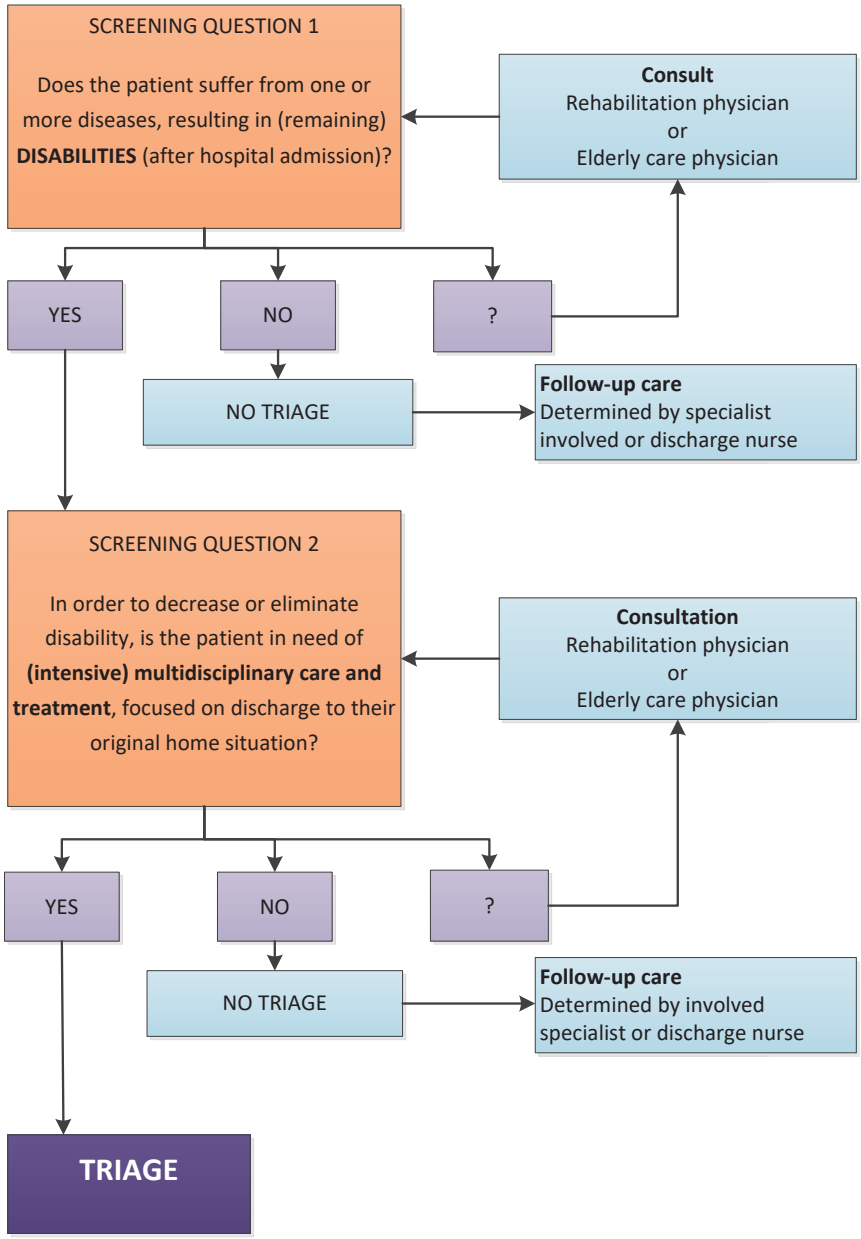
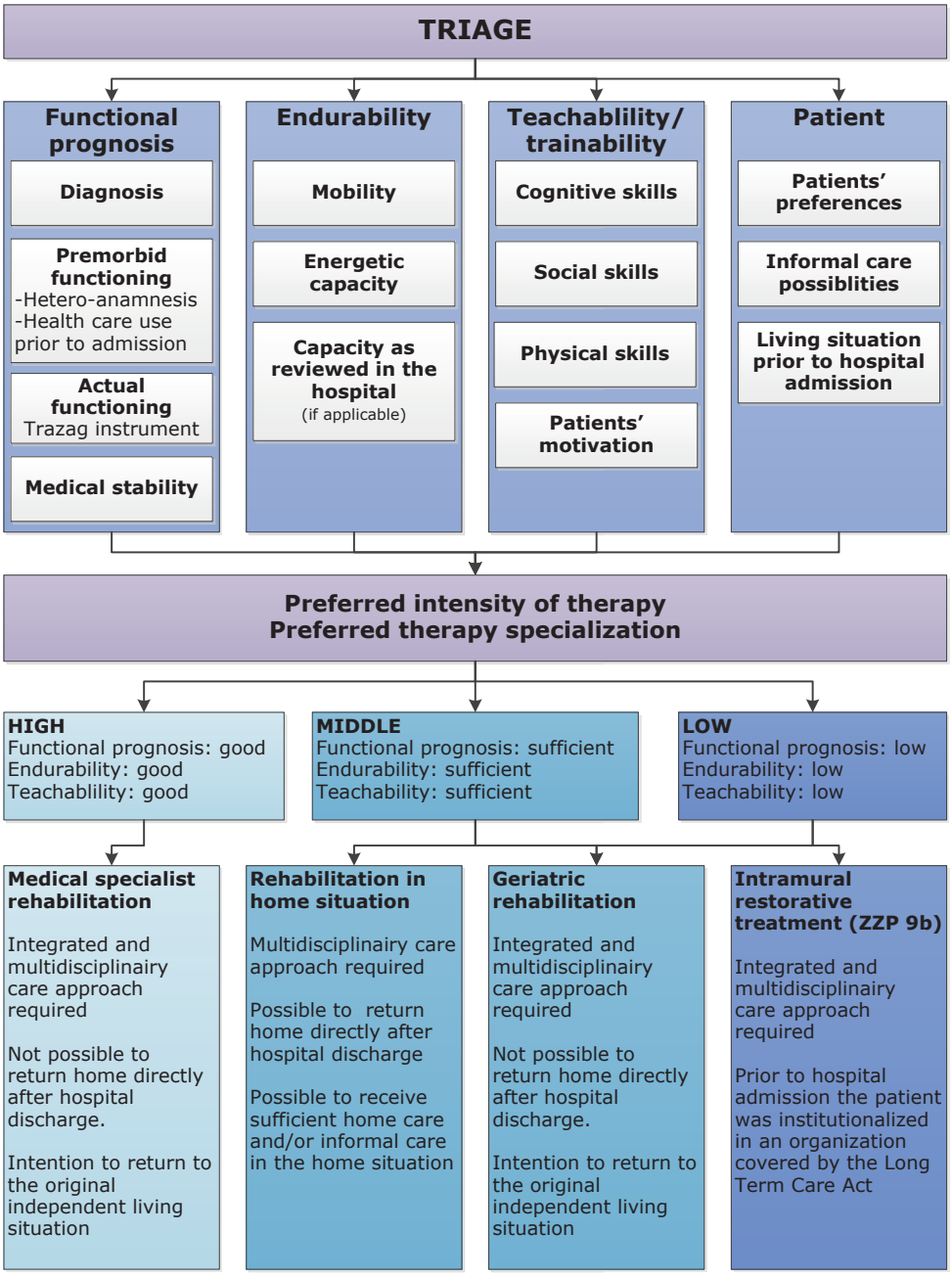
Appendix 1. Integrated care pathway for geriatric rehabilitation

Setting	No.	Care pathway element
Hospital	1	If the main treatment provider believes that the patient is eligible for geriatric rehabilitation, the discharge nurses of the hospital will be consulted. Preferably, this consultation takes place well in advance of discharge.
	2	Dismissal from the hospital is preceded by a triage by a discharge nurse. Information about the patient's functional prognosis, endurability, teachability and trainability and the patient's and informal caregiver's needs and abilities needs to be gathered to make this triage decision.
	3	The triage is always performed under the responsibility of an elderly care physician from the geriatric rehabilitation facility. If the discharge nurse has doubts about eligibility of the patient for geriatric rehabilitation, the elderly care physician should be consulted.
	4	Information about functional prognosis, endurability, teachability and trainability and needs and abilities of the patient should be gathered by consulting professionals in the hospital who have been involved in the patient's care.
	5	The patient should always be asked about their needs and abilities and this should explicitly be taken into account when making the triage decision.
	6	The informal caregiver should (if applicable) be asked about their ability to provide informal care and this should explicitly be taken into account when making the triage decision.
	7	The discharge nurse should always provide oral and written information about geriatric rehabilitation to the patient and the informal caregiver.
	8	On the day the patient is discharged from the hospital, an up-to-date list of medications, a medical and nursing discharge summary and, if necessary, a discharge summary from allied health professionals should be available for the professionals in the geriatric rehabilitation facility.
Geriatric rehabilitation facility	9	In the cases where the patient discharge summaries are not available on the day the patient is admitted to the geriatric rehabilitation facility, professionals from the geriatric rehabilitation facility should contact the hospital directly.
	10	All patients with complex care needs admitted to the geriatric rehabilitation facility receive a systematic and multidisciplinary examination to determine which rehabilitation program is suitable for the patient.
	11	The patient's rehabilitation program will be established in close consultation with patient and (if applicable) informal caregiver. The patient's wishes and abilities and their informal caregiving situation will be taken into account when determining this program.
	12	Multidisciplinary meetings are organized at least twice during the patient´s stay.
	13	Patients and (if applicable) informal caregivers should always receive feedback on the issues discussed during the multidisciplinary meetings. In those cases where a modification to the patient's rehabilitation program is desirable, this will be discussed with the patient and informal caregiver.
	14	Within two weeks after admission to the geriatric rehabilitation facility, the patient and (if applicable) informal caregiver will be informed about the patient's provisional discharge date.
	15	The treatment intensity should be adjusted (decreased or increased) if this is required by the progress the patient is making.
	16	The provisional discharge date should be adjusted (decreased or increased) if this is required by the progress the patient is making.
	17	Well before discharge, the patient's home situation should be mapped out by a physiotherapist or occupational therapist.

Setting	No.	Care pathway element
	18	After the home visit, advice should be given to the patient about required adjustments and aids in the home.
	19	The nurses in the geriatric rehabilitation facility should arrange home care prior to discharge of the patient.
	20	If the situation of the patient is complex, a professional of the home care organization will visit the geriatric rehabilitation facility for an intake.
	21	A professional of the home care organization will visit the geriatric rehabilitation facility for an intake if this is preferred by the patient.
	22	An up-to-date nursing discharge summary will be sent to the home care organization on the day of discharge.
	23	An up-to-date prescription for medication will be sent to the patient's pharmacy on the day of discharge.
	24	An up-to-date discharge summary by allied health professionals will be given to the patient on the day of discharge.
	25	An up-to-date medical discharge summary and medication list will be sent to the patient's general practitioner on the day of discharge.
	26	The discharge summary to the general practitioner includes information on the follow-up care advised.
Primary care	27	In those cases where the patient discharge summaries are not available to primary care on the day the patient is discharged from the geriatric rehabilitation facility, professionals from the primary care organizations should directly contact the geriatric rehabilitation facility.
	28	Once the patient is discharged from the geriatric rehabilitation facility, the nurse practitioner or district nurse in primary care should act as the patient's case manager.
All settings	29	A care pathway coordinator is appointed. The role of the care pathway coordinator is to act as a port of call for professionals involved in the pathway, to improve communication between professionals from different settings, improve continuity and coordinate care and to further streamline the pathway.
	30	At least twice per year, a meeting is organized between professionals from the hospital and from the geriatric rehabilitation facility who are involved in the triage process. The aim of this meeting is to evaluate whether or not the triage process, the medical discharge summaries and the transfer of patients between the hospital and the geriatric rehabilitation facility are satisfactory.
	31	At least once a year a meeting is organized between professionals from the geriatric rehabilitation facility and from primary care to evaluate the timing and quality of the medical discharge summaries and patient transfers.

Appendix 2. Screening questions and triage instrument




TRIAGE
Functional prognosis
Diagnosis
Premorbid functioning
-Hetero-anamnesis
-Health care use prior to admission
Actual functioning
Trazag instrument
Medical stability
Endurability
Mobility
Energetic capacity
Capacity as reviewed in the hospital
(if applicable)
Teachablility/ trainability
Cognitive skills
Social skills
Physical skills
Patients' motivation
Patient
Patients' preferences
Informal care possiblities
Living situation prior to hospital admission
Preferred intensity of therapy
Preferred therapy specialization
HIGH
Functional prognosis: good
Endurability: good
Teachablility: good
MIDDLE
Functional prognosis: sufficient
Endurability: sufficient
Teachability: sufficient
LOW
Functional prognosis: low
Endurability: low
Teachability: low
Medical specialist rehabilitation
Integrated and multidisciplinairy care approach required
Not possible to return home directly after hospital discharge.
Intention to return to the original independent living situation
Rehabilitation in home situation
Multidisciplinairy care approach required
Possible to return home directly after hospital discharge
Possible to receive sufficient home care and/or informal care in the home situation
Geriatric rehabilitation
Integrated and multidisciplinairy care approach required
Not possible to return home directly after hospital discharge.
Intention to return to the original independent living situation
Intramural restorative treatment (ZZP 9b)
Integrated and multidisciplinairy care approach required
Prior to hospital admission the patient was institutionalized in an organization covered by the Long Term Care Act

6

THE EFFECTIVENESS OF AN INTEGRATED CARE PATHWAY IN GERIATRIC REHABILITATION AMONG OLDER PATIENTS WITH COMPLEX HEALTH PROBLEMS AND THEIR INFORMAL CAREGIVERS

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Submitted

Abstract

Purpose: To improve continuity and coordination of care in geriatric rehabilitation, an integrated care pathway was developed and implemented in The Netherlands. The purpose of this study was to assess the effects of this pathway on patients and informal caregivers.

Methods: Two cohorts of patients and their informal caregivers were prospectively recruited before implementation of the pathway (2011-2012) and after implementation of the pathway (2013-2014). Primary outcome measures were dependence in activities of daily living in patients (KATZ-15) and self-rated burden among informal caregivers (SRB-VAS). Secondary outcome measures were the frequency of performing extended daily activities, social participation, psychological well-being, quality of life and discharge location (patients) and quality of life and objective care burden (informal caregivers). Outcomes were measured at baseline, after three and after nine months.

Results: A larger percentage of patients were discharged home in the care pathway cohort (88.6% vs 67.4%; p=0.004). Furthermore, after three months, patients from the care pathway cohort performed more extended daily activities (p=0.014) and informal caregivers experienced a lower self-rated burden (p=0.05). No differences were found for the other outcome measures.

Conclusion: Due to the positive effects of the integrated care pathway, we are inclined to recommend implementing the care pathway in regular care. To have longer lasting effects among patients and informal caregivers, we suggest actively disseminating information about the pathway to primary care providers who are currently still unaware of its content.

Background

Functional decline and deterioration in self-care abilities are common consequences of hospitalization among older adults, and can be exacerbated by inactivity and immobility during hospital stay.[1,2] As a result, after hospital admission a considerable number of community-living older patients are discharged to an inpatient geriatric rehabilitation facility where they receive short-term multidisciplinary care to restore functional independence, such as activities of daily living (ADL), to improve quality of life and to prepare them to return to their former living situation.[3]

A meta-analysis revealed that geriatric rehabilitation has beneficial effects on functional status and prevents permanent admission to nursing homes.[4] However, the fact that patients transfer between care settings (hospital, geriatric rehabilitation facility and primary care) and are confronted with multiple caregivers, forms a challenge for the coordination and continuity of care.[5,6] Frequently mentioned problems in these transitional phases are care plans not being communicated from one organization to the other, the transfer of medication lists which are not up-to-date or incomplete, and lack of communication between professionals from different organizations.[7-10] Furthermore, patients and their informal caregivers are often not sufficiently prepared for the transition to the home situation.[5] These problems in continuity of care could result in adverse events among patients, such as insufficient functional improvement, unnecessary hospital readmissions and permanent admission to a nursing home .[6,7,9] Moreover, care transitions affect the emotional, social, financial and physical functioning of informal caregivers. Therefore, inadequate care transitions are a substantial risk factor for high informal caregiver burden.[11]

Various transitional care interventions have been developed to deal with these problems; these interventions focus mainly on discharge planning and discharge support for older adults. A systematic literature review by Laugaland and colleagues showed that the majority of these programs have beneficial effects, but that most interventions focus on single groups of caregivers, such as nurses or occupational therapists. Furthermore, all studies in this review focused on discharge interventions from hospital to home and did not include transfer to post-acute care settings, such as geriatric rehabilitation facilities.[12]

To deal with challenges in continuity and coordination of care for patients who go through the trajectory of hospitalization, admission to a geriatric rehabilitation facility and discharge back to the home situation, an integrated care pathway in geriatric rehabilitation was developed and implemented in an urban region in the southern part of the Netherlands.[13] Integrated care pathways describe a sequence and timing of activities or interventions performed by care providers to obtain clinical goals. They comprise detailed information about which professional is responsible for these interventions and activities.[14] The integrated care pathway in geriatric rehabilitation focused on improving

communication, triage and transfers of patients between hospital, geriatric rehabilitation facility and primary care organizations. To evaluate the effectiveness of this pathway, a prospective cohort study was conducted with a usual care cohort and a care pathway cohort of patients and informal caregivers. This study assessed the effectiveness of this pathway in comparison with usual care with respect to the level of dependence in activities of daily living among patients and the self-rated burden among informal caregivers as primary outcomes. Furthermore, recent performance of extended daily activities, social participation, psychological well-being, quality of life and discharge location were assessed as secondary outcomes among patients, and, among informal caregivers, quality of life and objective care burden.

Methods

Study design

A prospective cohort study was used to assess the effects of the integrated care pathway. Two cohorts of patients and informal caregivers were prospectively recruited in the geriatric rehabilitation facility where the pathway was implemented. This geriatric rehabilitation facility was situated in the Maastricht area (in the southern part of the Netherlands). The first cohort of patients and informal caregivers (the care as usual cohort) was included in the period April 2011 – March 2012, prior to implementation of the care pathway. The second cohort (the care pathway cohort) was included in the period April 2013 - August 2014, after implementation of the pathway. This study design and methods were approved by the Medical Ethics Committee of University Hospital Maastricht (#11-4-020).

Participants

The participants of this study were patients admitted to a geriatric rehabilitation facility in Maastricht, the Netherlands, and their informal caregivers. In the Netherlands, patients admitted to a geriatric rehabilitation facility are categorized into four groups: patients with stroke, trauma orthopedics, elective orthopedics and the residual, referred to as patients with complex health problems. The pathway described in the present study was developed for this heterogeneous group of patients with complex health problems. These patients often suffer from multi-morbidity, mostly involving cardiac problems, problems with the respiratory system, neurological problems, oncological problems and other internal medicine problems such as gastrointestinal problems. Disease exacerbations are common in this group, leading to hospital readmissions and the necessity for geriatric rehabilitation. All patients from this group were eligible for

participation if they were admitted to the geriatric rehabilitation facility in the period April 2011-March 2012 or in the period April 2013 - August 2014, aged ≥ 65 years, admitted to the hospital prior to admission to the geriatric rehabilitation facility and were community-dwelling prior to hospital admission. Patients in the two cohorts were not eligible to participate if the elderly care physician assessed their cognitive status as insufficient for participation, based on their expert opinion.

Informal caregivers were recruited by asking the included patients who their main informal caregiver was, and whether they permitted the researchers to invite them for participation in the study. Informal caregiving was defined as voluntary and unpaid care, delivered on a structural basis to people with physical, cognitive of mental deficiencies. This could be either a family member or not. If the patient approved contacting their informal caregiver, the latter was invited for participation by telephone. All patients and informal caregivers provided written informed consent.

Intervention

The integrated care pathway was developed by reviewing relevant literature and consulting experts. Furthermore, iterative meetings with two multidisciplinary workgroups of professionals and one workgroup of patients and informal caregivers were organized. During these meetings, current practice, barriers to and incentives for change were analysed and proposals for improving the care process were generated. These proposals for improvement were critically discussed in the multidisciplinary workgroups, finally resulting in the integrated care pathway. The development and implementation process of the integrated care pathway is described in more detail elsewhere.[13] Due to the heterogeneity of this group of patients with complex health problems, the pathway is focused on the process of care instead of the contents of the rehabilitation treatment and involves the full trajectory of hospital admission, discharge to the geriatric rehabilitation facility and discharge back to the community. The key components of the pathway are the following:

1. A care pathway coordinator is appointed. The role of the care pathway coordinator is to act as a contact person for professionals involved in the pathway, to further streamline the care processes in the pathway and improve continuity and coordination of care.
2. A triage instrument is used by discharge nurses in the hospital. The instrument instructs discharge nurses to gather information for potential patients for geriatric rehabilitation about functional prognosis, endurability of the patient, teachability/trainability and patients' and informal caregiver's needs and abilities. This information should enable the nurses to decide if geriatric rehabilitation is indeed appropriate for a patient or not. If the discharge nurse has doubts about the ap-

propriateness of geriatric rehabilitation for a patient, the elderly care physician from the geriatric rehabilitation facility is consulted, and makes the final decision.
3. Patients and their informal caregivers are always actively involved in the triage decision in the hospital, and in the establishment of their care and treatment plan in the geriatric rehabilitation facility and in primary care;
4. All patient discharge summaries (medical, nursing and from allied care professionals) from the hospital to the geriatric rehabilitation facility and from the geriatric rehabilitation facility to primary care are sent on the day of discharge and are of high quality (clear and comprehensive);
5. Meetings between care professionals from the hospital and the geriatric rehabilitation facility are organized at least twice per year, and between the geriatric rehabilitation facility and primary care organizations at least once per year. These meetings focus on improving the triage process, the timing and quality of discharge summaries and the transfer of patients between the hospital, geriatric rehabilitation facility and primary care organizations.

The agreements in the care pathway can be retrieved in Appendix 1.
As the integrated care pathway was regular care from April 2013 onwards in the participating geriatric rehabilitation facility, all patients in the group of complex health problems admitted after April 2013 received care according to the pathway. In the care as usual cohort, there was no care pathway coordinator appointed, the decision to refer someone to the geriatric rehabilitation facility was made without the use of an official triage instrument and there were no structural meetings between professionals of the hospital, the geriatric rehabilitation facility and the primary care organizations. Furthermore, the active involvement of patients and informal caregivers in their rehabilitation trajectory and the timeliness and high quality of discharge summaries were not established in agreements or protocols in the care as usual cohort.

Outcome measures

The primary outcome measure used to evaluate the effects of the pathway on patients was dependence in activities of daily living, measured with the Katz Index KATZ-15.[15] This scale assesses one's ability to perform activities of daily living by asking 15 questions related to the (instrumental) activities of daily living, self-care and mobility. Each question could be answered with "no help needed" (0) or "help needed" (1) and a total score of 15 could be achieved. A higher score represents more dependence in activities of daily living.
Five secondary outcome measures were used to assess the effects of the pathway on the patients. The first secondary outcome measure was recent performance of extended daily activities, measured with the Frenchay Activities Index.[16] This index consists of 15 items assessing the frequency with which activities are performed that reflect the extended activities of daily life. These activities range from domestic chores, to leisure

and outdoor activities. The frequency of performing these activities can be scored on a scale ranging from "never" (1) to "often" (4). The second secondary outcome measure was social participation, assessed using two subscales of the Impact on Participation and Autonomy (IPA) questionnaire.[17] These subscales are "autonomy outdoors" and "social life and relationships" and consist, respectively, of 5 and 7 items. The questions examine the extent to which people are able to perform activities such as visiting friends and going on a trip or holiday whenever they want to (autonomy outdoors) and the degree to which they are able to interact with people on an equivalent level (social life and relationships). Answer options range from "very good" (1) to "poor" (5). Whereas the KATZ-15 thus mainly focuses on self-care and mobility, the FAI adds somewhat more complex leisure and outdoor activities. Finally, the IPA also focuses on interaction with other people. The third secondary outcome measure was psychological well-being, measured using a subscale from the RAND-36.[18] This subscale consists of five items focusing on feelings (such as happiness, sadness and nervousness) people experienced in the last month. These items have six answer categories each, ranging from "always" (1) to "never" (6). The fourth secondary outcome measure was quality of life, measured with a modified version of Cantril's Self Anchoring Ladder (CSAL).[15] This measure asks patients to value their quality of life on a scale ranging from 0-100, with higher scores indicating a better quality of life. The fifth and last secondary patient outcome measure assessed was discharge location after inpatient geriatric rehabilitation. This was scored as back home (0) or not back home (1), the latter including institutionalization (admission to an elderly care home, a nursing home or palliative care in a hospice), hospital readmission or death.

The primary outcome measure used to assess the effects of the pathway on informal caregivers was self-rated burden of informal caregiving, measured with the Self-Rated Burden Visual Analogue Scale (VAS). The self-rated burden VAS assesses on a scale from 0-10 how burdensome informal caregiving is for the informal caregiver, with a higher score indicating a higher burden.[19]
Secondary outcomes used to assess the effects of the pathway on informal caregivers were quality of life, assessed with a modified version of Cantril's Self Anchoring Ladder,[15] and objective burden of caregiving, measured using the Erasmus iBMG instrument.[16] This instrument asks informal caregivers how many hours per week they spend on various caregiving tasks.

Data collection

Primary and secondary outcome measures for this effect evaluation were collected through structured face-to-face interviews by a trained research assistant with patients, and, for informal caregivers, through written questionnaires. The interviews with patients were conducted at admission in the geriatric rehabilitation facility (baseline),

after three months and after nine months. The written questionnaires were sent to the informal caregivers using the same timeframes. Discharge location was assessed by reviewing patient files in the geriatric rehabilitation facility.

Statistical analysis

Statistical analyses were performed using the statistical software package SPSS for Windows, version 22. Descriptive statistics, independent t-tests and chi square tests were used to describe and compare the baseline characteristics of patients and informal caregivers in the two cohorts. Because data was collected longitudinally, a two-level mixed model was used to compare the two cohorts of patients and informal caregivers with respect to the continuous primary and secondary outcome measures. Repeated measurements were the first level observations and respondents were the second level observations. A longitudinal model was specified with the outcome variable as a function of all three time points treated as dependent. Adjusted mean differences were calculated to express the differences between groups and were fully corrected for baseline differences (by specifying group and time as main effects as well as the interaction between time and group). The group differences were also corrected for age, sex, living situation (not living alone vs. living alone), educational level (lower than vocational school vs. vocational school or higher), multi-morbidity (one condition vs. the presence of two or more conditions). As the secondary outcome measure “discharge location” is dichotomous (home vs. not home), this outcome measure was analysed with a standard logistic regression model. The previously mentioned covariates for patients (i.e. age, sex, living situation, educational level, and multi-morbidity) were also included in this model.

For the informal caregivers, covariates included in each multilevel model were age, sex and living situation (not living with care receiver vs. living with care receiver). Adjusted mean differences were calculated to express the differences between groups, fully corrected for baseline differences. Missing data among patients and among informal caregivers were assumed to be missing at random.

Results

Patients

In total, 260 patients in the two cohorts were eligible for participation in the study: 71 in the care as usual cohort and 189 in the care pathway cohort. In the care as usual cohort, 49 patients agreed to participate (69%) and in the care pathway cohort this number was 113 (60%). The reasons for not participating were rather similar in both cohorts. Figure 1 shows the flowchart of the patient study population.
Because six patients in the care as usual cohort and seven patients in the care pathway cohort did not participate in the baseline measurement (because they dropped out of the study prior to their first interview or had only follow-up measurements), these patients were not included in the analyses. Thus the total number of patients in the analyses was 43 and 106, respectively. Total dropout during the course of the study in the care as usual cohort was 24 (56%) and 38 (36%) in the care pathway cohort. The reasons for dropout are provided in Figure 1 as well.

Figure 1. Flowchart of Patients through the Study

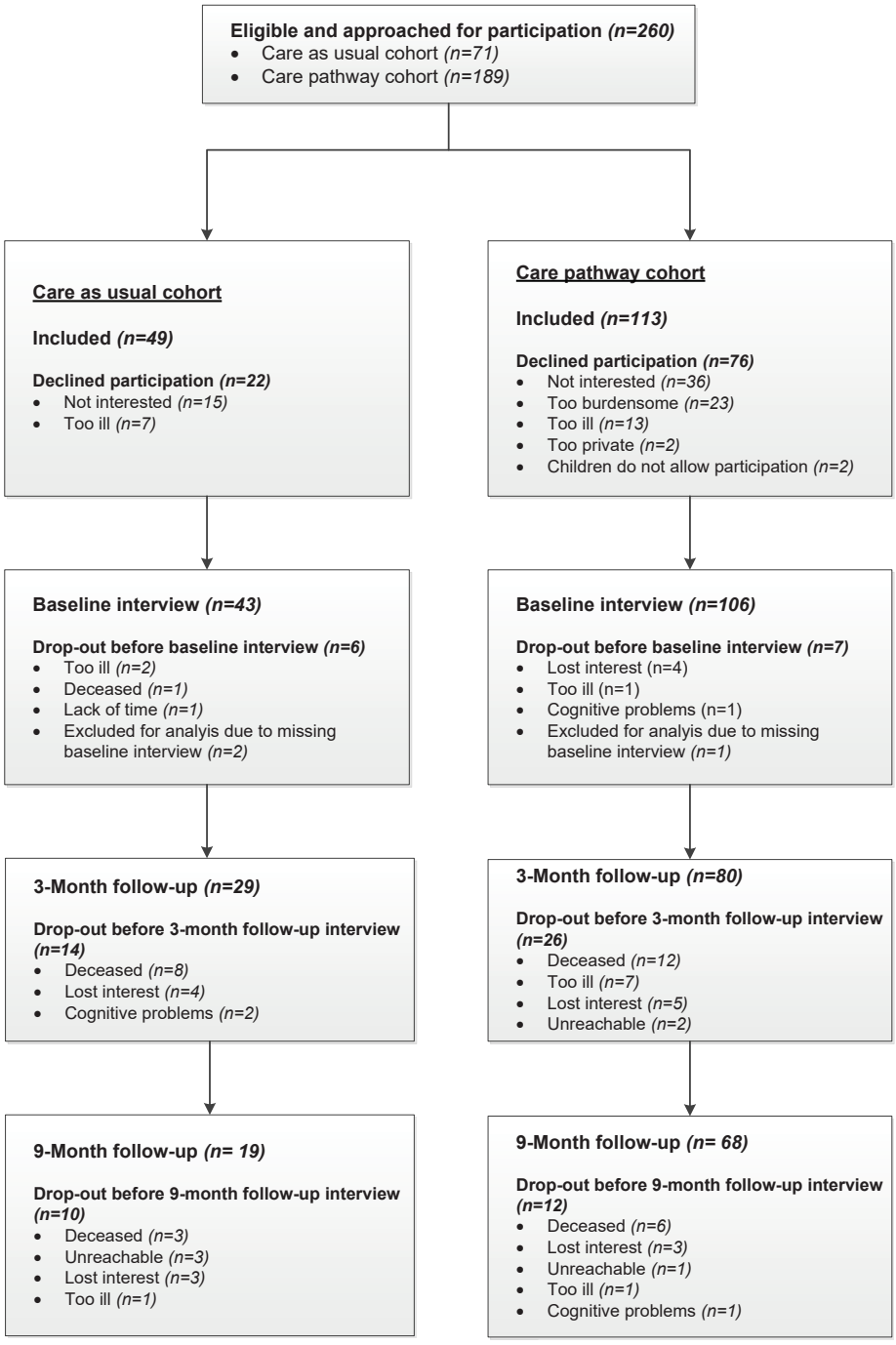

Table 1 shows the baseline characteristics of the patients. More patients in the care pathway cohort suffered from diseases of the locomotor system in comparison with the care as usual cohort (18.1% versus 4.7%). There are no other statistically significant differences between the two cohorts.

Table 1. Baseline Characteristics of Patients in Both Cohorts

Characteristics	Care as usual cohort n=43	Care pathway cohort n=106	p-value
Mean age (sd)	79.6 (7.1)	80.7 (6.9)	0.370
Sex (% female)	65.0%	67.9%	0.471
Living situation (% living alone)	67.4%	68.9%	0.865
Education (% ≥vocational school)	60.5%	67.9%	0.385
Multi-morbidity (% having at least 2 conditions)	87.8%	88.7%	0.882
Medical diagnosis:			
Cardiovascular diseases (n, %)	16 (37.2%)	24 (22.9%)	0.074
Internal medicine diseases (n, %)	15 (34.9%)	30 (28.6%)	0.449
Oncological diseases (n, %)	5 (11.6%)	7 (6.7%)	0.331
Respiratory diseases (n, %)	4 (9.3%)	11 (10.5%)	0.547
Diseases of locomotor system (n, %)	2 (4.7%)	19 (18.1%)	0.033†
Neurological diseases (n, %)	1 (2.3%)	8 (7.6%)	0.448
Other (n, %)	0 (0%)	6 (5.7%)	0.181
Primary outcome measure			
Dependence in activities of daily living (mean score KATZ-15; range 0-15*) (sd)	6.6 (3.7)	5.7 (3.3)	0.179
Secondary outcome measures			
Extended daily activities (mean score FAI; range 15-60) (sd)	33.5 (9.6)	32.2 (8.7)	0.411
Social participation (mean score IPA; range 12-60) (sd)	30.5 (6.5)	29.2 (6.2)	0.310
Psychological well-being (mean score subscale RAND-36; range 5-30) (sd)	21.1 (6.2)	21.8 (5.6)	0.481
Quality of life (mean score CSAL; range 1-100) (sd)	66.4 (12.9)	65.6 (14.8)	0.768

KATZ-15 = modified version of the Katz Index of Independence in Activities of Daily Living; FAI = Frenchay Activities Index; IPA = Impact on Participation and Autonomy; CSAL = Cantril's Self Anchoring Ladder.

*The underlined score represents the most favorable score.

† Statistically significant (p-value <0.05).

Informal caregivers

In total, 26 informal caregivers were included in the care as usual cohort and 28 informal caregivers in the care pathway cohort. In the care as usual cohort, 9 patients (20.9%) indicated not having an informal caregiver. Furthermore, 9 informal caregivers did not participate because the person they cared for died (n=4) or they were not interested in participating (n=4). In the care pathway cohort, the main reasons for not participating were that (a) the patient indicated not having a caregiver (n=32), (b) the caregiver was not interested in participating (n=24), or (c) the patient did not want to burden the informal caregiver (n=10).
In table 2, the background characteristics of the informal caregivers are displayed. In the care as usual cohort, two informal caregivers participated only in follow-up measurements, and in the care pathway cohort, six informal caregivers participated only in follow-up measurements. Therefore, these informal caregivers did not have scores on the primary and secondary outcome measures at baseline. As shown in table 2, the differences in baseline characteristics between the two groups at baseline are not statistically different.

Table 2. Baseline Characteristics of Informal Caregivers in Both Cohorts.

Characteristics	Care as usual cohort n=26	Care pathway cohort n=28	p-value
Mean age (sd)	58.9 (14.4)	61.3 (13.9)	0.537
Sex (% female)	20 (76.9%)	20 (71.4%)	0.645
Living together with patient (%)	8 (30.8%)	5 (17.9%)	0.267
Primary outcome measure	n=24	n=22	
Self-rated burden of informal caregiving (mean score SRB; 0-10*) (sd)	4.7 (2.8)	5.5 (2.5)	0.289
Secondary outcome measures			
Quality of life (Mean score CSAL; range 0-100*) (sd)	70.9 (13.8)	71.0 (12.1)	0.991
Mean (sd) objective burden of caregiving (Erasmus iBMG)			
Domestic duties (hours/week)	6.1 (9.3)	7.7 (13.6)	0.654
Personal care (hours/week)	1.7 (4.3)	0.17 (0.76)	0.121
Moving outside the house (hours/week)	4.2 (3.8)	5.3 (4.0)	0.401
Number of hours help of other informal caregivers / volunteers (hours/week)	1.6 (2.8)	1.1 (2.3)	0.610

SRB = Self-Rated Burden; CSAL = Cantril's Self Anchoring Ladder.
*The underlined score represents the most favorable score.

In the care as usual cohort, 10 informal caregivers dropped out during the study due to variable reasons: the patient died (n=6), the informal caregiver did not return the questionnaire (n=3) or lost interest (n=1). In the care pathway cohort, 14 informal caregivers dropped out for the following reasons: the patient died (n=7), the caregivers indicated

they no longer had informal care tasks (n=3), they simply did not return the questionnaire (n=2), they lost interest (n=1), or were too ill (n=1).

Effects of the integrated care pathway on patients

The mixed model analysis showed no difference after three and nine months in the primary outcome measure, dependence in activities of daily living as measured with the KATZ-15. The adjusted mean difference was -0.51 (p=0.360) after three months and -0.14 (p=0.862) after nine months (table 3). Furthermore, a significant adjusted mean difference of 4.14 (p=0.014) was found for the secondary outcome measure as measured with the FAI – the frequency of performing extended daily activities - after three months. This significant difference disappeared after nine months (adjusted mean difference = 1.84, p=0.288). No significant differences were found for social participation, psychological well-being and quality of life after three and nine months.

Table 3. Multilevel Analysis for Differences between Patients in the Two Cohorts at 9-Month Follow-up (n=149)

	3-month follow-up Mean (SD) *		Adj. mean difference‡ (95% CI)	p-value	9-month follow-up Mean (SD) *		Adj. mean difference‡ (95% CI)	p-value
Primary outcome measure	CUC; n=26	CPC; n=75	n=147		CUC; n=19	CPC; n=68	n=147	
Dependence in activities of daily living (KATZ-15; range 0-15§)	5.7 (2.8)	4.6 (2.4)	-0.51 (-1.60, 0.59)	0.360	5.0 (3.0)	4.4 (2.9)	-0.14 (-1.41, 1.12)	0.862
Secondary outcome measures								
Extended daily activities (FAI; range 15-60)	27.4 (9.7)	31.1 (9.4)	4.14 (0.86, 7.42)	0.014†	29.4 (11.2)	31.0 (9.4)	1.84 (-1.58, 5.26)	0.288
Social participation (IPA; range 12-60)	31.0 (6.2)	28.9 (6.8)	-1.20 (-4.28, 1.88)	0.441	30.8 (8.0)	30.8 (8.3)	-0.27 (-4.70, 4.16)	0.903
Psychological well-being (Subscale RAND-36; range 5-30)	22.8 (5.0)	23.7 (4.7)	-0.53 (-2.61, 1.54)	0.610	22.8 (6.3)	22.9 (5.6)	-0.91 (-3.67, 1.94)	0.529
Quality of life (CSAL; range 0-100)	67.9 (14.1)	70.7 (9.4)	4.95 (-2.17, 12.08)	0.171	71.4 (9.2)	68.9(16.4)	1.54 (-7.29, 10.37)	0.730

CUC = Care as Usual Cohort, CPC = Care Pathway Cohort; KATZ-15 = modified version of the Katz Index of Independence in Activities of Daily Living; FAI = Frenchay Activities Index; IPA = Impact on Participation and Autonomy; CSAL = Cantril's Self Anchoring Ladder.

***** Unadjusted means.

† = Statistically significant (p-value <0.05).

‡ = Adjusted for age, sex, living situation, educational level, multi-morbidity and the interaction term "group*time".

§ = The underlined score represents the most favorable score.

As shown in table 4, a significantly higher proportion of patients in the care pathway cohort were discharged to their home situation compared to patients in the care as usual cohort (88.6% vs 67.4%; p=0.004).

Table 4 Discharge Location after Geriatric Rehabilitation

	Care as usual cohort N= 43	Care pathway cohort N= 106	P-value*
Home	29 (67.4%)	94 (88.6%)	0.004†
Not home	14 (32.6%)	12 (11.4%)	

*Adjusted for age, sex, living situation, educational level and multi-morbidity
† Statistically significant (p-value <0.05)

Effects of the integrated care pathway on informal caregivers

As shown in table 5, after three months there was a significant adjusted mean difference for the primary outcome measure self-rated burden (SRB) among informal caregivers (-1.54; p=0.05). The significance of this difference disappeared after 9 months (p=0.077). Table 5 shows that implementation of the integrated care pathway did not result in significant differences between the two cohorts of informal caregivers on the secondary outcome measures after three and nine months (table 5).

Table 5. Multilevel Analysis for Differences between Informal Caregivers in the Two Cohorts at 9-Month Follow-up (n=54)

	3-month follow-up Mean (SD) *		Adj. mean difference‡ (95% CI)	p-value	9-month follow-up Mean (SD) *		Adj. mean difference‡ (95% CI)	p-value
Primary outcome measure	CUC; n=18	CPC; n=19	n=54		CUC; n=16	CPC; n=14	n=54	
Self-rated burden of informal caregiving (SRB; 0-10§)	5.4 (2.2)	4.1 (2.4)	-1.54 (-3.08, -0.00)	0.050†	4.4 (2.2)	3.5 (2.6)	-1.54 (-3.25, 0.17)	0.077
Secondary outcome measures								
Quality of life (CSAL; range 0-100)	68.2 (14.3)	73.2 (15.2)	3.11 (-3.86, 10.01)	0.371	68.7 (11.3)	73.2 (8.2)	5.26 (-2.24, 12.77)	0.158
Mean objective burden of caregiving (Erasmus iBMG)								
Domestic duties (hours/week)	11.7 (20.9)	9.7 (14.0)	-3.15 (-13.14, 6.84)	0.525	10.4 (12.8)	9.1 (12.5)	-4.54 (-14.54, 5.46)	0.361
Personal care (hours/week)	2.0 (3.9)	0.9 (2.4)	0.54 (-1.80, 2.87)	0.646	4.1 (10.5)	(12.4)	2.99 (-5.36, 11.33)	0.470
Moving outside the house (hours/week)	3.2 (2.7)	3.8 (2.6)	-0.72 (-3.33, 1.90)	0.583	3.9 (4.2)	5.6 (8.1)	1.65 (-3.40, 6.71)	0.510
Number of hours help from other informal caregivers / volunteers (hours/week)	1.9 (3.0)	1.0 (1.7)	-0.67 (-2.67, 1.32)	0.500	6.4 (20.8)	2.9 (4.8)	-1.92 (-11.73, 7.89)	0.684

CUC = Care as Usual Cohort, CPC = Care Pathway Cohort.

* Unadjusted means.

† Statistically significant (p-value <0.05)

‡ Adjusted for age, sex, living situation and the interaction term “group*time”.

§The underlined score represents the most favorable score

Discussion

This study examined if implementation of an integrated care pathway in geriatric rehabilitation resulted in lower dependence in activities of daily living among patients and decreased self-rated burden among informal caregivers. The results of this study show that implementation of the pathway had no significant effect on level of dependence in activities of daily living among patients over a period of three and nine months. A statistically significant effect was found for self-rated burden among informal caregivers after three months. However, this effect disappeared after nine months. With respect to secondary outcome measures, our study showed that the pathway had a significant effect on the frequency of performing extended daily activities among patients after three months. This effect also disappeared after nine months. No significant effect was found for the secondary outcome measures social participation, psychological well-being and quality of life among patients, or on quality of life and objective care burden among informal caregivers after three and nine months. However, a significantly higher proportion of patients in the care pathway cohort were discharged back home in comparison with patients in the care as usual cohort.

It is noteworthy to mention that an effect was found on the secondary outcome measure performance of extended activities of daily living, while no effect was found on the primary outcome measure independence in activities of daily living. A reason could be that the integrated care pathway is focused on the active involvement of patients in the establishment of their rehabilitation goals. When rehabilitation goals are tailored and more personalized towards the patient's wishes and preferences, patients will probably be better prepared to restart leisure and outdoor activities once discharged to the home situation. This might indicate that patients are taught how to resume these extended daily activities, irrespective of their limitations or level of dependence in activities of daily living.

The statistically significant favourable outcomes on 'frequency of performing extended daily activities' among patients and 'self-rated burden' among informal caregivers after three months, disappeared after 9 months. An explanation for the disappearance of these effects could be that the pathway is focused on patients who transfer between hospital, geriatric rehabilitation facility and home. After patients returned home, the integrated care pathway turns into regular primary care. This means that the reach of the pathway (i.e. the active involvement of the care pathway coordinator) extends to approximately one month after discharge of a patient from the geriatric rehabilitation facility. Thus, after nine months, the pathway activities are no longer active. Still, it was expected that due to the improved transfer phases and improved coordination of follow-up care, the effects of the integrated care pathway would carry on for a longer period of time. Another explanation could be that the number and variety of professionals providing primary care in the Maastricht region is large (i.e. home care provid-

ers, general practitioners, physiotherapists, occupational therapists, etc.) and rather dispersed. Although we tried to reach all primary care providers via their professionals associations, it is possible that not all providers were aware of the content of the integrated care pathway. In addition it is possible that the care providers who were aware of the agreements of the pathway did not always act upon these agreements, due to lack of time, motivation or other hindering factors. Therefore, in the future it should be more closely monitored to which extent primary care professionals are actually aware of the pathway and have implemented its different components in daily practice. Targeted implementation strategies should then be deployed to improve the implementation of the care pathway in primary care.
Finally, a process evaluation executed alongside this study (described elsewhere) showed that this care pathway is a promising start, but there seems to be room for optimization as well.[20]

Due to a lack of studies in the area of geriatric rehabilitation, it is not possible to compare our results to related studies within the domain. However, several studies concerning inter-organizational care pathways involving hospital and primary care showed positive results regarding care coordination, morbidity, drug-related adverse events, hospital readmission rates, emergency department visits and healthcare costs.[21-24] Patient-related outcomes such as dependence in activities of daily living and perceived burden of care for informal caregivers were not assessed in these studies.
Although this pathway was developed in the Netherlands, the majority of its content is relevant internationally as well. As an increasing number of older people suffer from multi-morbidity, they mostly receive care from a range of professionals in various organizations.[22] The principles of this pathway regarding inter-organizational collaboration and improved communication between providers can be used to facilitate continuity and coordination of care between these organizations.

Some limitations of our study should be mentioned. First, because the effects of the pathway were studied in a prospective cohort study where the care as usual cohort was included in 2011-2012 and the care pathway cohort was included in 2013-2014, the possible influence of external factors on the results has to be considered. Although the use of the triage instrument by discharge nurses in the hospital was a fundamental part of the integrated care pathway, the stricter admission criteria for geriatric rehabilitation enforced by this triage instrument were accompanied by the nationwide introduction of stricter admission criteria in 2013. These criteria were used to facilitate the development and implementation of the triage instrument. Although this has probably influenced the type of patients who were eligible for geriatric rehabilitation, the two cohorts were comparable on their baseline characteristics.

Second, because our patient population was highly frail (as indicated by the fact that almost 20% of the patients died during the course of the study; Figure 1), the number of patients included was relatively low and the number of dropouts was large. This is also true for the group of informal caregivers: many patients in the care pathway cohort stated that they were independent prior to hospital admission and therefore did not have an informal caregiver. This resulted in smaller numbers for inclusion which also could have resulted in the failure to detect an effect. Furthermore, selective dropout might have resulted in underestimation or overestimation of our results. However, because the reasons for dropout are rather similar across cohorts we have no reason to assume that they are disproportionately related to the primary or secondary outcome measures. Furthermore, because multilevel analyses were performed, the risk of bias due to missing values decreased.

Our study has two important strengths as well. First, as an observational design was used to assess the effects of the pathway, there was room for optimisation and adjustment of the pathway during the implementation phase based on the needs and circumstances of the organisations involved. Therefore, results of this evaluation can be interpreted as 'real world' results, which makes it more likely that results are generalisable towards other geriatric rehabilitation settings. Furthermore, because thorough research into the effects of integrated care pathways across organizational and disciplinary borders is scarce,[21] this study forms a unique and valuable contribution to existing knowledge in the complex domain of integrated care pathways and geriatric rehabilitation care.

Conclusion

We conclude that implementation of the integrated care pathway resulted in a significantly higher proportion of patients being discharged to the home situation after geriatric rehabilitation. Furthermore, the frequency of performing extended daily activities among patients in the care pathway cohort was significantly higher after three months compared to patients in the care as usual cohort, and the self-rated burden of informal caregivers was significantly lower after three months. Based on the positive results on these outcome measures, we are inclined to recommend implementing the integrated care pathway in regular care. When implementing the pathway in regular care, it is important to keep monitoring the effects on patients and informal caregivers, but also on process related factors such as length of stay in hospital and in geriatric rehabilitation facility. It is also recommended to optimize the pathway elements which were not fully implemented according to plan, and to explore if all primary care providers in the Maastricht region are aware of the content of the integrated care pathway. Based on this exploration, targeted implementation strategies should be used for those primary care

professionals who are unaware of its content or have not implemented it in daily practice. It is expected that this may prolong effects on patients and informal caregivers.

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Appendix 1. Integrated Care Pathway for Geriatric Rehabilitation

Setting	No.	Care pathway element
Hospital	1	If the main treatment provider believes that the patient is eligible for geriatric rehabilitation, the discharge nurses of the hospital will be consulted. Preferably, this consultation takes place well in advance of discharge.
	2	Dismissal from the hospital is preceded by a triage by a discharge nurse. Information about the patient's functional prognosis, endurability, teachability and trainability and the patient's and informal caregiver's needs and abilities needs to be gathered to make this triage decision.
	3	The triage is always performed under the responsibility of an elderly care physician from the geriatric rehabilitation facility. If the discharge nurse has doubts about the patient's eligibility for geriatric rehabilitation, the elderly care physician should be consulted.
	4	Information about functional prognosis, endurability, teachability and trainability and needs and abilities of the patient should be gathered by consulting professionals in the hospital who have been involved in the patient's care.
	5	The patient should always be asked about their needs and abilities and this should explicitly be taken into account when making the triage decision.
	6	The informal caregiver should (if applicable) be asked about their ability to provide informal care and this should explicitly be taken into account when making the triage decision.
	7	The discharge nurse should always provide oral and written information about geriatric rehabilitation to the patient and the informal caregiver.
	8	On the day the patient is discharged from the hospital, an up-to-date list of medications, a medical and nursing discharge summary and, if necessary, a discharge summary from allied health professionals should be available for the professionals in the geriatric rehabilitation facility.
Geriatric rehabilitation facility	9	In the cases where the patient discharge summaries are not available on the day the patient is admitted to the geriatric rehabilitation facility, professionals from the geriatric rehabilitation facility should contact the hospital directly.
	10	All patients with complex care needs admitted to the geriatric rehabilitation facility receive a systematic and multidisciplinary examination to determine which rehabilitation programme is suitable for the patient.
	11	The patient's rehabilitation programme will be established in close consultation with patient and (if applicable) informal caregiver. The patient's wishes and abilities and their informal caregiving situation will be taken into account when determining this programme.
	12	Multidisciplinary meetings are organised at least twice during the patient´s stay.
	13	Patients and (if applicable) informal caregivers should always receive feedback on the issues discussed during the multidisciplinary meetings. In those cases where a modification to the patient's rehabilitation programme is desirable, this will be discussed with the patient and informal caregiver.
	14	Within two weeks after admission to the geriatric rehabilitation facility, the patient and (if applicable) informal caregiver will be informed about the patient's provisional discharge date.
	15	The treatment intensity should be adjusted (decreased or increased) if this is required by the progress the patient is making.
	16	The provisional discharge date should be adjusted (decreased or increased) if this is required by the progress the patient is making.
	17	Well before discharge, the patient's home situation should be mapped out by a physiotherapist or occupational therapist.

Setting	No.	Care pathway element
	18	After the home visit, advice should be given to the patient about required adjustments and aids in the home.
	19	The nurses in the geriatric rehabilitation facility should arrange home care prior to discharge of the patient.
	20	If the situation of the patient is complex, a professional of the home care organisation will visit the geriatric rehabilitation facility for an intake.
	21	A professional of the home care organisation will visit the geriatric rehabilitation facility for an intake if this is preferred by the patient.
	22	An up-to-date nursing discharge summary will be sent to the home care organisation on the day of discharge.
	23	An up-to-date prescription for medication will be sent to the patient's pharmacy on the day of discharge.
	24	An up-to-date discharge summary by allied health professionals will be given to the patient on the day of discharge.
	25	An up-to-date medical discharge summary and medication list will be sent to the patient's general practitioner on the day of discharge.
	26	The discharge summary to the general practitioner includes information on the follow-up care advised.
Primary care	27	In those cases where the patient discharge summaries are not available to the primary care providers on the day the patient is discharged from the geriatric rehabilitation facility, professionals from the primary care organisations should directly contact the geriatric rehabilitation facility.
	28	Once the patient is discharged from the geriatric rehabilitation facility, the nurse practitioner or district nurse in primary care should act as the patient's case manager.
All settings	29	A care pathway coordinator is appointed. The role of the care pathway coordinator is to act as a port of call for professionals involved in the pathway, to improve communication between professionals from different settings, improve continuity and coordinate care and to further streamline the pathway.
	30	At least twice per year, a meeting is organised between professionals from the hospital and from the geriatric rehabilitation facility who are involved in the triage process. The aim of this meeting is to evaluate whether or not the triage process, the medical discharge summaries and the transfer of patients between the hospital and the geriatric rehabilitation facility are satisfactory.
	31	At least once a year a meeting is organised between professionals from the geriatric rehabilitation facility and from primary care to evaluate the timing and quality of the medical discharge summaries and patient transfers.

7

AN ECONOMIC EVALUATION OF AN INTEGRATED CARE PATHWAY IN GERIATRIC REHABILITATION FOR OLDER PATIENTS WITH COMPLEX HEALTH PROBLEMS

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Submitted

Abstract

Background: Integrated care pathways are increasingly used as a tool to structure care, enhance coordination and improve transitions between care settings. However, little is known about their economic impact. The objective of this study is to determine the cost-effectiveness and cost-utility of an integrated care pathway designed for patients with complex health problems transferring from the hospital, a geriatric rehabilitation facility and primary care.

Methods: This economic evaluation was performed from a societal perspective alongside a prospective cohort study with two cohorts of patients. The care as usual cohort was included before implementation of the pathway and the care pathway cohort after implementation of the pathway. Both cohorts were measured over nine months, during which intervention costs, healthcare costs, patient and family costs were identified. The outcome measures were dependence in activities of daily living (measured with the KATZ-15) and quality adjusted life years (EQ-5D-3L). Costs and effects were bootstrapped and various sensitivity analyses were performed to assess robustness of the results.

Results: After nine months, the average societal costs were significantly lower for patients in the care pathway cohort (€50,791) versus patients in the care as usual cohort (€62,170; CI=-22,090, -988). Patients in the care pathway cohort had better scores on the KATZ-15 (1.04), indicating cost-effectiveness. No differences were found between the two groups on QALY scores.

Conclusions: The results of this study indicate that the integrated care pathway is a cost-effective intervention. Therefore, it is recommended that the integrated care pathway be disseminated on a wider scale. When looking at QALYs, no effects were found. Therefore, it is also recommended to explore if therapy in geriatric rehabilitation could also pay attention to other quality of life-related domains, such as mood and social participation.

Background

For community-dwelling older patients who are admitted to the hospital, it is not always possible to directly return home after discharge. Functional decline and deterioration in self-care abilities, usually instigated by acute events and by inactivity during hospital stays, often results in the need for admission to an inpatient geriatric rehabilitation facility.[1] Here, patients receive multidisciplinary care to restore functional independence and prepare to safely return to their original home situation.[2, 3] Because these community-dwelling older patients require care from different healthcare providers in various settings, they need to make multiple transitions between care settings. These care transitions expose patients to problems regarding continuity of care, such as lack of communication between care providers, errors in medication lists, or insufficient quality of discharge summaries.[4-6] When continuity of care is not adequately organized, serious negative consequences may occur, such as deterioration of illness, hospital readmissions, permanent placement in nursing homes, or even death.[4, 7, 8] Not only do these adverse events cause considerable harm to patients and their informal caregivers, they may also incur high costs. In the U.S. nearly 20% of all older adults admitted to the hospital are readmitted within a month, costing approximately $25 billion every year. It is estimated that of these 20% readmissions, 75% could be prevented.[9] Furthermore, medication errors are estimated to cost $3.5 billion annually in the U.S. Two-thirds of the medication errors occur during care transitions.[10, 11]

Integrated care pathways are increasingly used as a tool to improve care transitions. Integrated care pathways describe the sequence and timing of actions in order to achieve patient outcomes with optimal efficiency. They are intended to structure care and enhance coordination with the goal of improved efficiency, patient safety and continuity of care.[12-14] A systematic review of the literature by Allen and colleagues[15] demonstrated that integrated care pathways are, amongst others, effective in improving communication with patients, informal caregivers and health professionals, and in ensuring that patients receive safe and relevant interventions or assessments.[15] Although different systematic reviews have yielded positive effects for care pathways[15-17], less is known about their economic impact.[18, 19] A systematic review by van Herck and colleagues published in 2004 focused on the identification of indicators to evaluate clinical pathways. This review found that of the 131 papers comprising any form of financial evaluation, more than 80% reported a positive effect.[16] However, it was unclear from these studies which methodology was used to calculate costs and which costs, in which settings, were taken into account. In more recent years, only a few studies have assessed the cost-effectiveness of integrated care pathways and among these studies, the patient groups and settings where the pathways were implemented, vary widely.[20-24]

Between 2012 and 2014, an integrated care pathway in geriatric rehabilitation was developed and implemented in the Netherlands for older patients with complex health problems.[25] In Dutch geriatric rehabilitation facilities, patients are categorized into four groups: 1) patients with strokes; 2) trauma orthopaedics; 3) elective orthopaedics; and 4) the remaining, classified as patients with complex health problems. Patients with complex health problems are often multi-morbid and suffer from a variety of chronic diseases (e.g., respiratory, gastro-intestinal, cardiac, neurological or oncological problems). This pathway aimed to improve continuity and coordination of care for community-dwelling patients who go through the trajectory of hospitalization, admission to a post-acute geriatric rehabilitation facility and discharge back to the home situation where they often receive primary care. The pathway focussed on improving communication, triage and transfers of patients between the hospital, the geriatric rehabilitation facility and primary care organizations.[25] As patients who go through this pathway use multiple healthcare services, the corresponding costs may be high. Implementing the integrated care pathway was expected to result in decreased dependence in activities of daily living, improved quality of life and reduced overall costs. The objective of this study was to determine the cost-effectiveness of this integrated care pathway from a societal perspective by comparing a cohort of patients who received care as usual with a cohort of patients who received care in the integrated care pathway.

Methods

Guidelines

This study followed the Consolidated Health Economic Evaluation Reporting Standards (CHEERS) Statement[26] and the Dutch manual for cost research and reference prices in health care.[25] The study design and methods were approved by the independent Medical Ethics Committee of University Hospital Maastricht/Maastricht University (#11-4-020).

Study design

This study describes an economic evaluation from a societal perspective. This evaluation was embedded in a prospective cohort study with two cohorts of patients and informal caregivers. The design, methods, feasibility and effects of this prospective cohort study will be described elsewhere. The first cohort (the reference cohort) received care as usual and was included between April 2011 - March 2012, prior to implementation of the integrated care pathway. The second cohort (the care pathway cohort) was included between April 2013 and September 2014.

Setting and subjects

The participants of this study were patients who were admitted to a geriatric rehabilitation facility (which in the Netherlands are usually situated in a nursing home) and their informal caregivers. These patients were eligible for participation if they were part of the group of patients with complex health problems, were admitted to the geriatric rehabilitation facility in the inclusion period mentioned in the paragraph 'study design', aged ≥ 65 years, were community-dwelling and hospitalized prior to admission to the geriatric rehabilitation facility. Patients were excluded if the elderly care physician assessed their cognitive status as insufficient to participate in the study. If a patient confirmed having an informal caregiver, this informal caregiver was invited to participate in the study as well. The informal caregiver could be a family member or a non-family member, provided that they delivered voluntary and unpaid care on a structural base. All patients and informal caregivers provided written informed consent.

Intervention

The integrated care pathway is comprised of cross-organizational agreements on coordination and continuity of care for older patients who transfer between the hospital, the geriatric rehabilitation facility and primary aftercare in the home situation. The main components of the care pathway were the following: 1) an appointed care pathway coordinator who acted as a liaison between professionals in different organizations and encouraged communication and information exchange between the organizations involved; 2) a newly developed triage instrument was used in the hospital, which provided guidance and support in determining the eligibility of potential patients for referral to geriatric rehabilitation or to another form of rehabilitation; 3) active involvement of patients and informal caregivers in all decisions regarding their rehabilitation trajectory (in the hospital, geriatric rehabilitation facility and primary care); 4) high quality and timely submission—on the day of discharge—of all patient discharge summaries (from the hospital to the geriatric rehabilitation facility and from the geriatric rehabilitation facility to primary care providers; 5) structural evaluation meetings organized between professionals from the hospital, the geriatric rehabilitation facility and primary care organizations. The agreements in the integrated care pathway can be retrieved in Appendix 1.

In the care as usual cohort the five aforementioned components were not established in agreements or protocols. This means that professionals in the care as usual cohort did not have a care pathway coordinator, or an official triage instrument. Furthermore, patients and their informal caregivers were not structurally involved in decisions regarding their rehabilitation trajectory. Agreements about the timeliness and quality of discharge summaries were not formally established in protocols, and there were no struc-

tural evaluation meetings between professionals of the hospital, the geriatric rehabilitation facility and primary care organizations.

Time horizon and data collection

The costs and effects of the integrated care pathway were evaluated for every patient, over nine months, after inclusion. Because a societal perspective was used to evaluate the cost-effectiveness, intervention costs, health care costs, and patient and family costs were identified. As all participants were beyond the retirement age of 65 years, productivity losses were not taken into account in this study. Data were collected using structured face-to-face interviews with patients at baseline (at time of admission to the geriatric rehabilitation facility), after three months and after nine months. These interviews were performed by a trained research assistant. Informal caregivers of the patients received a questionnaire in which they were asked to assess the hours of informal care they provided per week. Furthermore, data were collected from the registration system in the hospital and the registration system in the geriatric rehabilitation facility.

Costs

The intervention costs (costs of the integrated care pathway) were assessed by means of a short digital questionnaire. In this questionnaire professionals involved in the care pathway were asked to quantify the average time they had spent on tasks related to the pathway on a structural basis (e.g. costs of the care pathway coordinator and structural meetings between organizations). Costs of developing the integrated care pathway were excluded as these sunk costs will be disregarded in future implementation of the pathway. In the care as usual cohort, the intervention costs were zero.
Health care volumes were assessed by face-to-face interviews with patients. In these interviews, which were performed by a trained research assistant, participating patients were asked to indicate the healthcare services they used in a certain period (i.e. the six months before baseline, three months after baseline and six months later). The healthcare services under evaluation were temporary admission to a residential care facility, a nursing home, GP contacts, outside-of-hours GP services, home care, day care, medical specialist consultations and contact with allied health professionals, such as physiotherapists or occupational therapists. The number of days admitted to the university hospital of Maastricht and the number of days admitted to the local geriatric rehabilitation facility (part of the category 'nursing home admissions' were measured using registration systems from the hospital and the geriatric rehabilitation facility. Patient and family costs were also assessed in these face-to-face interviews, and can be categorized by assistive devices and environmental adaptations, hours of informal caregiving and travel expenses. Patients were asked if they purchased or received any assistive devices or environmental adaptations (e.g. in their home) and informal caregivers

were asked about the number of hours per week they spent on informal care activities (i.e. domestic duties, personal care, moving outside the house and the number of hours other informal caregivers provided help). As exact travel distances to health care services were unknown, we used standard distances as recommended in the Dutch manual for cost research and reference prices in health care.[25]

Health care use, assistive devices, environmental adaptations and travel expenses were valued using the updated Dutch manual for cost research and reference prices in health care.[25] If no prices were listed in the manual (which mainly pertains to assistive devices and environmental adaptations), costs were obtained from websites specializing in the sale of assistive devices and environmental adaptations. To calculate the intervention costs, wages of professionals were multiplied by the hours they indicated spent on tasks induced by the pathway. Healthcare costs were calculated by multiplying the volume of healthcare used by the price of the unit obtained from the Dutch manual for cost research and reference prices in health care. This manual recommends to value informal care at the price of a professional housekeeper. Travel expenses were calculated by multiplying the number of visits to a healthcare service (e.g. GP contacts, medical specialist consultations and contact with allied health professionals) with standard distances and transportation prices, including parking fees. Both standard distances and transportation prices were provided by the manual for cost research and reference prices.[25]

All costs in this study were expressed in euros (€). Most of the patients were included in 2014 and therefore, all prices were adjusted by the 2014 consumer price index. Because the respondent follow-up period was nine months, discounting of effects was not needed.

Effects

The clinical effects of this study were assessed using face-to-face interviews with patients. The primary outcome measure for this cost-effectiveness analysis (CEA) was level of dependence in activities of daily living, assessed by the KATZ Index of activities of daily living (KATZ-15).[27] This index evaluates one's ability to perform activities of daily living using 15 questions about (instrumental) activities of daily living. Every question can be answered by 'no help needed' (0) or 'help needed' (1). The sum score ranges from 0-15 and a higher score represents more dependence in activities of daily living.[27]

The primary outcome measure for the cost-utility analysis (CUA) was quality-adjusted life years (QALY), measured with the EuroQol-5D-3L.[28] This instrument assesses one's quality of life by measuring five domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The scores on these domains create a health profile, which can be converted into a utility using a tariff.[28] In this study, the Dutch tariff was used.[29] The utilities acquired at baseline, after three months and after nine months, were used to calculate QALYs using the linear area under the curve method.[30] QALYs generally range from 0-1 with a score of 1 representing a perfect health state

within one year and 0 representing death. It is also possible to have a negative QALY, representing a health status 'worse than dead'. With a follow-up period of 9 months, a minimum QALY score of
-0.25 and a maximum QALY score of 0.75 could be obtained.

Missing data

Missing data on both costs and clinical effects were assumed to be missing at random. Missing data on the costs were handled using the individual mean imputation technique. In cases where participants did not have one, single measurement of a cost item, the average of their cohort (the care as usual cohort or the care pathway cohort) was used. The mean of the group was also used for missing data on assistive devices and environmental adaptations. Missing data on the clinical effects (KATZ-15 and EQ-5D-3L) were imputed using the group mean. For patients who died, their costs and utilities were valued zero in consecutive measurement periods. Furthermore, the worst KATZ-15 score within the group the patient belonged to was taken as the KATZ-15 score for people who died.
If a patient indicated that they did not have an informal caregiver, the costs of informal caregiving were valued at zero. If the data was missing because the informal caregiver did not participate or dropped out of the study, the average cost for the group the informal caregiver belonged to (the care as usual cohort or the care pathway cohort) was used.

Statistical analysis

Descriptive statistics, independent t-tests and Chi square tests were used to describe patients' characteristics at baseline and to identify baseline differences between the two cohorts on the outcome measures (KATZ-15 and EQ-5D-3L). Descriptive statistics were also used to present mean volumes and costs of health care use at baseline. Due to skewedness of the cost-data, non-parametric bootstrapping (1,000 times) was performed to compare baseline costs. To correct for baseline cost differences at the patient level, a regression-based adjustment in the follow-up data was performed. This method adjusts the total costs with a regression model, where total costs are taken as the dependent variable and baseline costs as the independent variable.[31]
Costs after 9 months were compared with non-parametric bootstrapping (1,000 times). Statistically significant differences in costs were determined using a 95% Confidence Interval (CI). If the value '0' was included in the CI, this was an indication of no cost difference between the groups. An incremental cost-effectiveness ratio (ICER) was calculated by dividing the difference in costs between the two cohorts by the difference in KATZ-15 score. When performing bootstrap analyses, a higher score is understood to represent a positive outcome. Therefore, only for bootstrapping purposes, the KATZ-15 scores were reversed (a higher score representing less dependence in activities of daily living).

An incremental cost-utility ratio was calculated by dividing the difference in costs by the difference in QALYs. To estimate the sample uncertainty around the ICERS, the costs and effects were also bootstrapped (5,000 times) and these 5,000 cost-effectiveness ratios and the 5,000 cost-utility ratios were presented on two incremental-cost effectiveness planes (CE-planes) with four quadrants.[28]
A cost-effectiveness acceptability curve (CEAC) was created to show the probability that the integrated care pathway is cost-effective, compared to care as usual, for a range of willingness-to-pay values. The willingness-to-pay (WTP) is the amount society is willing to pay for one extra unit of clinical effect (one QALY or one point added on the KATZ). Because the WTP threshold for the KATZ-15 is unknown, a range of values will be shown. Also, no information is available regarding the WTP for one extra QALY in our sample. The Dutch National Health Care Institute published a report in 2015 on the burden of illness and corresponding WTPs. In this report, low, moderate and high burden of illness correspond with WTPs of €20,000, €50,000 and €80,000, respectively.[32] Given the high age, frailty and multi-morbidity in our sample, we classified the participants as having a moderate burden of illness. Therefore, their corresponding WTP was €50,000. Statistical tests were performed using SPSS for Windows version 22.0 and bootstrapping was done using Excel 2010.

Sensitivity analyses

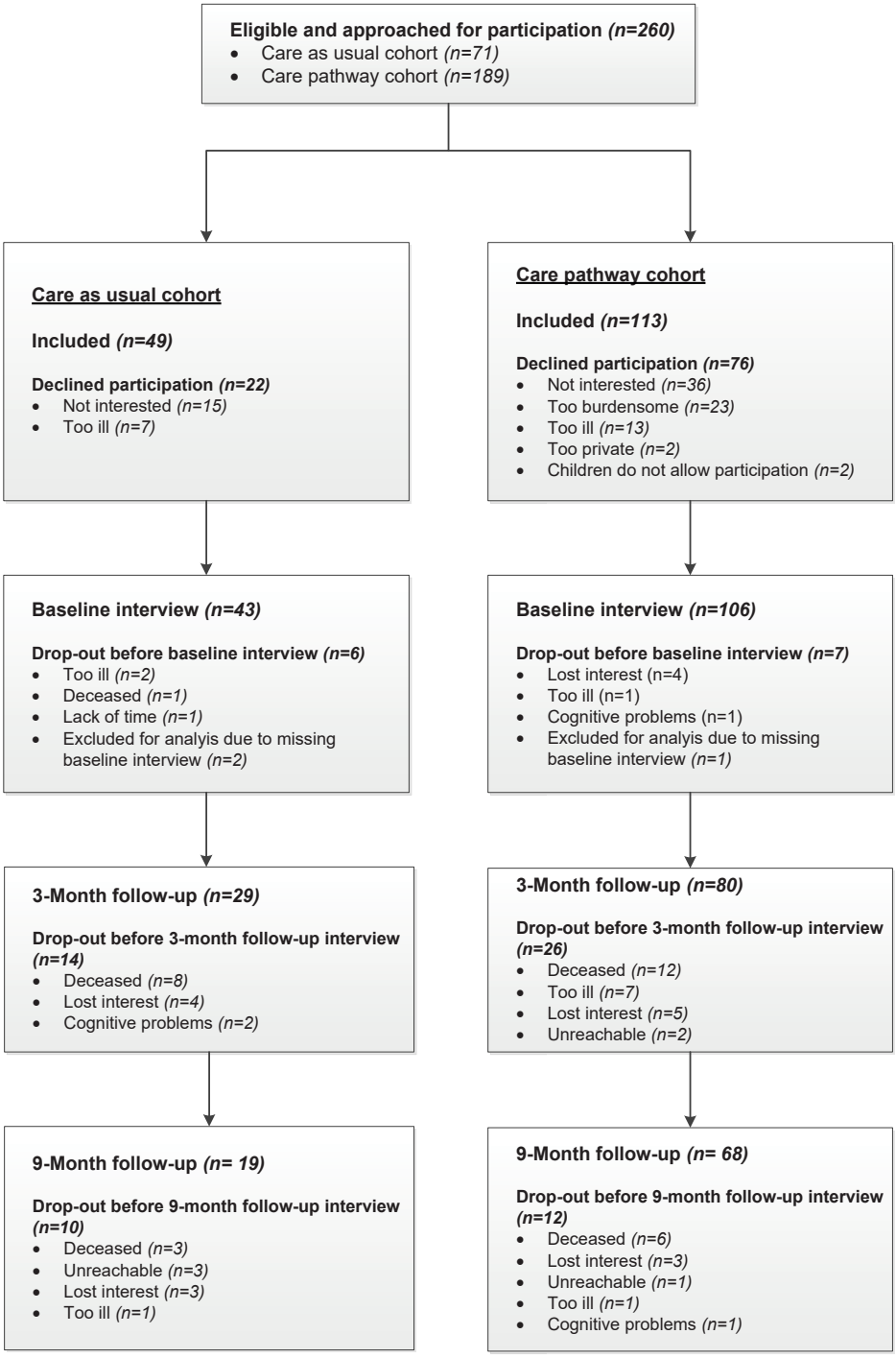
Five sensitivity analyses were conducted to evaluate the robustness of the results: 1) taking only survivors into account; 2) taking only complete cases into account; 3) using a different KATZ-15 score for patients who died; 4) using the healthcare perspective, and 5) using QALYs based on the UK tariff instead of the Dutch tariff. First, due to the frailty level of the population, a large percentage of patients dropped out during the course of the study. Therefore, a large part of the data was imputed using individual mean imputation (costs), mean imputation (clinical effects) or valuing costs and utilities at zero and using the worst KATZ-15 score of the cohort in consecutive measurement periods (patients who died). To investigate the potential impact of imputing this data, the first sensitivity analysis only took survivors into account and the second analysis was performed with only complete cases. The third sensitivity analysis used a KATZ-15 score of 15 (total dependence in activities of daily living) as a score for patients who died, instead of the worst KATZ-15 score of the cohort. Furthermore, because the intervention costs were roughly estimated and because possible (monetary) gains (caused by increased efficiency incurred by the pathway) were not measured, the societal perspective for calculating costs was compared with a health care perspective. Finally, as utilities can be calculated using different tariffs, the last sensitivity analysis was performed with QALYs based on the UK tariff.

Results

Study population

In total, 49 patients in the care as usual cohort agreed to participate in the study (69% of the eligible 71 patients) and 113 patients were included in the care pathway cohort (60% of the eligible 189).
Prior to the baseline interview, 6 patients in the care as usual cohort and 7 patients in the care pathway cohort dropped out of the study due to various reasons. Therefore, a total of 43 and 106 participants were included in the study. Figure 1 shows the flowchart of the patients in the study and the reasons for drop-out. Figure 1 also shows that the percentage of missing data after three months was 32.6% (n=14) in the care as usual cohort and 60.5% (n=26) in the care pathway cohort. These percentages were 22.6% (n=24) and 35.8% (n=38), respectively, after nine months.

Figure 1. Flowchart of Patients



In the care as usual cohort, 26 informal caregivers were included. Out of the included 43 patients, 9 patients (20.9%) did not have an informal caregiver and 8 informal caregivers did not want to participate because they were not interested (n=4) or the person they cared for had died (n=4). In the care pathway cohort, 28 informal caregivers were included. 32 out of 106 patients (30.2%) indicated they did not have an informal caregiver. The two other main reasons for not participating were no interest in participation (n=24), and patients did not want to burden their informal caregiver (n=10). As shown in Table 1, background characteristics measured at baseline are comparable for the patients in the two cohorts.

Table 1. Background Characteristics of Patients in Both Cohorts Measured at Baseline

	Care as usual cohort n=43	Care pathway cohort n=106	p-value
Characteristics			
Mean age (sd)	79.6 (7.1)	80.7 (6.9)	0.370
Sex (% female)	65.0%	67.9%	0.471
Living situation (% living alone)	67.4%	68.9%	0.865
Education (% High education)	60.5%	67.9%	0.385
Mean number of morbidities (sd)	3.6 (2.1)	3.5 (1.8)	0.882
Outcome measures			
KATZ-15 mean score (sd) (range 0-15*)	6.6 (3.6)	5.7 (3.3)	0.156
EQ-5D-3L Dutch tariff mean score (sd) (range -0.329 - 1*)	0.53 (0.28)	0.51 (0.30)	0.622

*The underlined score represents the most preferable score.

Health care use and patient and family costs at baseline are displayed in Table 2. This table shows that patients in the care as usual cohort spent significantly more days in the hospital in the last six months compared to patients in the care pathway cohort (8.8 days versus 3.5 days). Furthermore, patients in the care pathway cohort spent significantly less days at day care compared to patients in the care as usual cohort (0 versus 9.1). The total baseline costs were significantly higher in the care as usual cohort (€13,777 versus €10,311). For this reason, a regression-based adjustment was performed.

Table 2. Healthcare Use/Costs, Patient and Family Costs at Baseline

	Care as usual cohort (n=43)		Care pathway cohort (n=106)		Bootstrapping
Healthcare use/costs (last 6 months)	**Mean use (SD)**	**Total costs (€)**	**Mean use (SD)**	**Total costs (€)**	**95% CI**
Days in hospital	8.8 (14.3)	5,600.6 (1351.7)	3.5 (7.7)	2,180.6 (470.5)	(-6,519, -789)*
Days in nursing home	2.1 (14.0)	672.2 (654.4)	0.3 (3.3)	103.6 (100.6)	(-1,997, 299)
Days in care home	0.0 (0.0)	0 (0)	9.1 (39.1)	898.1 (381.6)	(210, 1721)*
Regular contact with GP	2.9 (2.6)	94.5 (13.4)	4.1 (4.8)	134.6 (15.3)	(-1, 80)
Contact with GP during out-of-office hours	0.4 (0.7)	45.7 (13.4)	0.6 (1.2)	70.1 (13.9)	(-12, 62)
Professional homecare (hours/week)					
Nursing care	0.2 (0.6)	299.4 (160.0)	0.04 (0.3)	98.4 (55.7)	(-567, 92)
Personal care	1.0 (1.8)	1,354.2 (337.9)	1.1 (1.8)	1,392.2 (222.8)	(-746, 804)
Domestic care	1.6 (1.7)	835.7 (138.0)	1.3 (1.4)	653.6 (69.5)	(-489, 102)
Number of half days per week in day care	0.2 (0.7)	325.6 (184.3)	0.05 (0.4)	83.2 (68.1)	(-656, 76)
Contact with medical specialist	2.2 (2.9)	114.4 (22.0)	2.4 (2.6)	125.1 (13.2)	(-39, 60)
Contact with allied professional	8.5 (18.1)	281.0 (88.7)	11.5 (15.9)	394.3 (56.1)	(-89, 320)
Total healthcare costs		9,604.6 (1620.1)		6,096.0 (667.5)	(-6,884, -246)*
Patient and family costs (last 6 months)					
Costs assistive devices/environmental adaptations		371.7 (107.6)		410.7 (94.8)	(-245, 301)
Total travel costs		202.9 (2.2)		204.1 (1.2)	(-4, 6)
Informal care (hours per week)	10.1 (12.8)	3,658.4 (687.3)	9.8 (9.0)	3,559.8 (313.1)	(-1,677, 1224)
Total costs		13,777.1 (1639.0)		10,310.8 (804.3)	(-7,177, -198)*

*Statistically significant difference

Cost analysis

Intervention costs of the integrated care pathway were on average, €77.60 per patient. These costs consisted mainly of the care pathway coordinator and the structural evaluation meetings. Total societal costs during the nine month follow-up period for the care as usual cohort were €62,170, on average, whereas for the care pathway cohort, they were €50,791. These total costs were adjusted for baseline cost differences using the regression-based adjustment method.[31] As shown by the confidence interval, this difference is statistically significant (CI -22,090, -988). These lower costs are mainly the result of shorter hospital stays (39.2 vs. 27.0 days) and shorter nursing home stays (79.1 vs. 55.4 days) (Table 3). This table also shows that the number of contacts with the GP increased in the care pathway cohort (3.3 visits for the care as usual cohort versus 4.9 visits for the care pathway cohort; CI = 11, 98) and that the number of visits to a day care centre significantly decreased (on average, 0.5 half days per week in the care as usual cohort and 0.1 half days per week in the care pathway cohort; CI = 1,576, 40). The total healthcare costs in the care pathway cohort were also significantly lower (57,350 vs. 42,516; CI=-24,900, -4,525).

Table 3. Healthcare Use/Costs, Patient and Family Costs During the Nine Month Follow-Up Period

	Care as usual cohort (n=43)		Care pathway cohort (n=106)		Bootstrapping
Healthcare costs (9 months follow-up)	Mean use (SD)	Total costs (€)	Mean use (SD)	Total costs (€)	95% CI
Intervention costs		0		77.6	
Days in hospital	39.2 (21.4)	20,861.5 (1808.1)	27.0 (26.3)	13,555.7 (1124.0)	(-11,358, -3,310)*
Days in nursing home	79.1 (75.8)	24,902.4 (3651.4)	55.4 (38.5)	17,229.0 (1211)	(-15,613, -252)*
Days in care home	13.0 (58.1)	1,205.6 (841.3)	13.6 (55.4)	1,355.3 (548.1)	(-1,804, 2,012)
Regular contact with GP	3.3 (3.1)	109.1 (14.8)	4.9 (5.0)	162.0 (16.2)	(11, 98)*
Contact with GP during out-of-office hours	0.3 (0.5)	32.6 (54.9)	0.5 (1.4)	8.4 (15.2)	(-9, 58)
Professional homecare (hours/week)					
Nursing care	0.5 (1.8)	617.5 (664.1)	0.4 (1.3)	368.2 (206.2)	(-888, 761)
Personal care	2.7 (3.5)	2,721.2 (534.4)	3.4 (4.2)	3,404.5 (406.5)	(-659, 2029)
Domestic care	3.0 (4.0)	1,227.4 (236.1)	3.0 (3.2)	1,193.1 (124.9)	(-593, 443)
Number of half days per week in day care	0.5 (1.5)	815.7 (410.8)	0.1 (0.5)	137.5 (76.6)	(1,576, 40)*
Contact with medical specialist	3.2 (3.6)	167.6 (27.7)	4.5 (4.5)	236.4 (21.8)	(-3, 132)
Contact with allied professional	16.7 (29.2)	542.1 (139.7)	27.4 (29.7)	897.9 (94.2)	(-7, 676)
Total healthcare costs		57,350.1		42,516.4	(-24,900, -4,525)*
Patient and family costs (9 months follow-up)					
Costs assistive devices/environmental adaptations		647 (181.5)		588.7 (101.7)	(-489, 312)
Total travel costs		400.2 (2.7)		406.8 (2.3)	(-1, 13)
Informal care (hours per week)	27.0 (36.5)	7,701.2 (1730.4)	20.3 (23.0)	5,762.6 (657.7)	(-5,900, 1,302)
Total costs unadjusted		65,993.19 (4732.0)		49,232.4 (2467.6)	(-27,248, -6,721)*
Total costs (9 months follow-up)*∞		62,169.59 (4807.91)		50,791.38 (2473.7)	(-22,090, -988)*

*Statistically significant difference

∞ Adjusted for baseline differences.

Cost-effectiveness and cost-utility

Table 4 shows the incremental cost-effectiveness and the incremental cost-utility. Implementation of the integrated care pathway resulted in less dependence in activities of daily living (1.04) and lower costs (-€11,605). The difference in QALYs between the two groups was 0.01.

Table 4. Differences in Costs and Effects Between the Two Cohorts and Corresponding ICERS

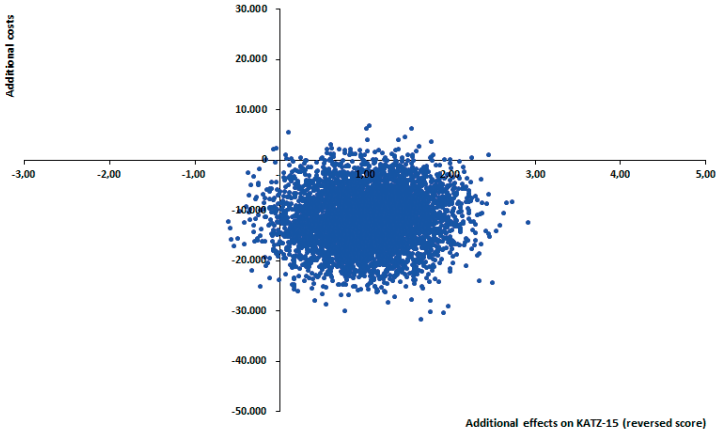
		Total costs in €			Total effects*			
Analysis	Effect measure	CUC (n=43)	CPC (n=106)	Δ Costs	CUC (n=43)	CPC (n=106)	Δ Effects	ICER
Cost-effectiveness	KATZ-15	62,326	50,720	-11,605	8.52	9.56	1.04	-11,186
Cost-utility	QALY	62,326	50,720	-11,605	0.37	0.377	0.01	-2,304,876

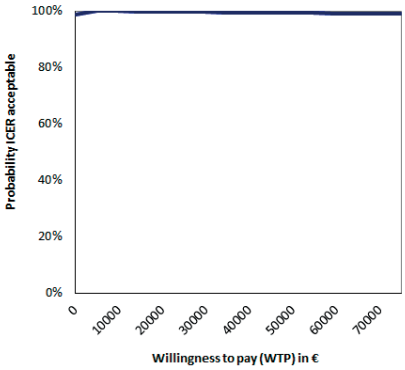
CUC=Care as Usual Cohort; CPC = Care Pathway Cohort; ICER = Incremental Cost-Effectiveness Ratio.

* For bootstrapping purposes, the KATZ-15 scores have been reversed; therefore a higher score represents less dependence in activities of daily living.

As displayed in the cost-effectiveness plane for the KATZ-15 (Figure 2), 97% of the bootstrapped ICERS were in the dominant (southeast) quadrant, indicating more effects and lower costs. As the willingness-to-pay threshold for daily functioning as measured with KATZ-15 is unknown, a range of WTP thresholds are shown in the cost-effectiveness acceptability curve in Figure 2 (see Methods). As the pathway results in more effects and saves costs, this curve shows that the probability of the integrated care pathway being cost-effective (when compared to care as usual) remains 99% or higher for a range of willingness-to-pays.

Figure 2. Cost-effectiveness Plane and incremental cost-effectiveness acceptability curve KATZ-15*

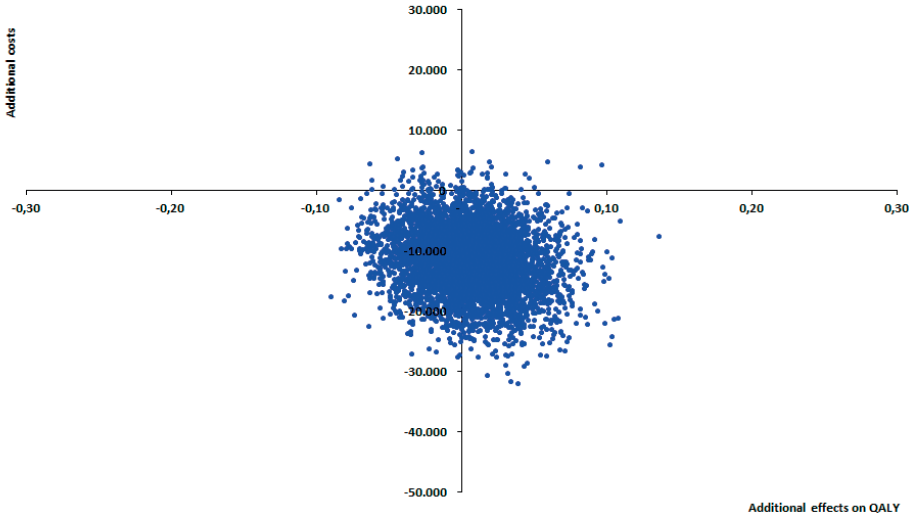


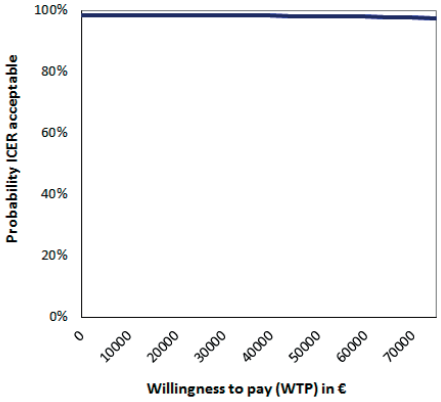


*For bootstrapping purposes, the KATZ-15 scores have been reversed; therefore a higher score represents less dependence in activities of daily living.

The cost-utility plane for QALYS (Figure 3) displays that 56% of the incremental cost-utility ratios were located in the dominant quadrant. Due to the fact that no differences in QALYs were detected, all remaining ratios were in the southwest quadrant. As shown by the CEAC in Figure 3, the probability of the integrated care pathway being cost-effective, compared to care as usual at WTP of €50.000 (moderate burden of illness), is 98%.

Figure 3. Cost-Utility Plane and Incremental Cost-Utility Acceptability Curve QALY





Sensitivity analyses

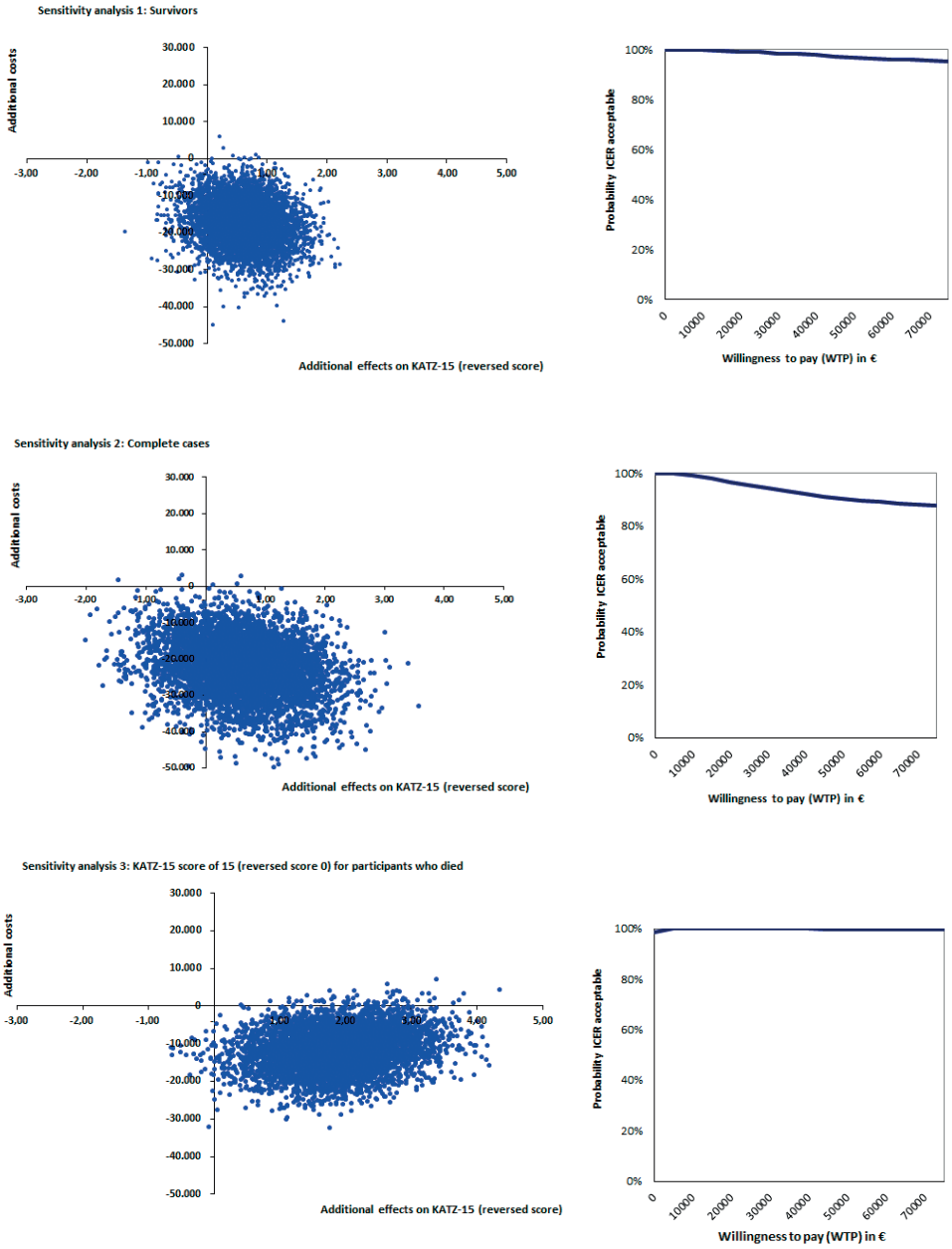
The sensitivity analyses show fair robustness of the results for all cost-effectiveness analyses (Table 5). Where 97% of all ICERs were located in the dominant quadrant, this percentage ranges from 78% to 100% in the five sensitivity analyses. As shown in figure 4, the probability of the pathway being cost-effective remains high and stable for a range of WTPs in all sensitivity analyses.

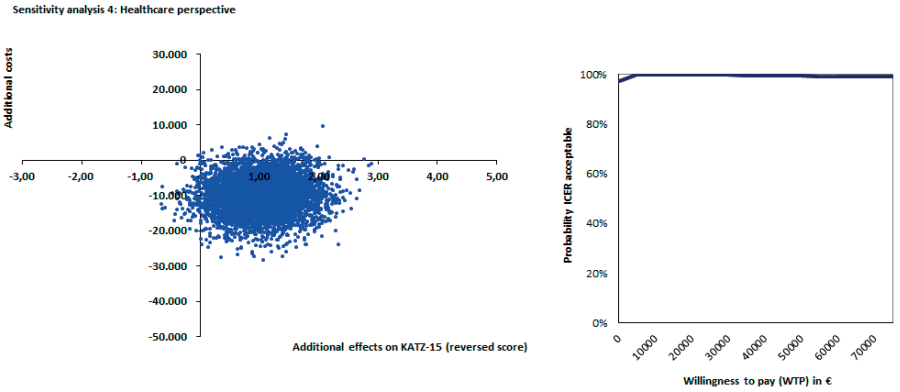
Table 5. Results of the Base Case Analysis and the Sensitivity Analyses

				Distribution (%) of ICERS in cost-effectiveness plane			
	Δ Costs	Δ Effects	ICER	NE	SE (dominant)	SW	NW (inferior)
Base case analysis; CUC (n=43), CPC (n=106)							
KATZ-15	-11,605	1.04	-11,186	1%	97%	2%	0%
QALY	-11,605	0.01	-2,304,876	0%	56%	43%	1%
Sensitivity analysis 1: Only survivors; CUC (n=32), CPC (n=88)							
KATZ-15	-17,139	0.62	-27,724	0%	90%	10%	0%
QALY	-17,139	-0.02	1,100,879	0%	34%	66%	0%
Sensitivity analysis 2: Complete cases; CUC (n=19), CPC (n=68)							
KATZ-15	-22,298	0.62	-36,101	0%	79%	21%	0%
QALY	-22,298	-0.01	3,397,262	0%	43%	57%	0%
Sensitivity analysis 3: KATZ-15 score of 0 for participants who died; CUC (n=43), CPC (n=106)							
KATZ-15	-11,605.3	1.87	-6,191	1%	98%	1%	0%
Sensitivity analysis 4: Healthcare perspective; CUC (n=43), CPC (n=106)							
KATZ-15	-9,693	1.04	-9,342	3%	95%	2%	0%
QALY	-9,693	0.01	-1,925,041	1%	55%	43%	1%
Sensitivity analysis 5: QALY UK Tariff CAU (n=43), CPC (n=106)							
QALY	11,605	-0.02	661,873	0%	22%	76%	2%

*CUC=Care as Usual Cohort; CPC = Care Pathway Cohort; ICER = Incremental Cost-Effectiveness Ratio, NE= north-east quadrant; SE=south-east quadrant; SW = south-west quadrant; NW=north-west quadrant

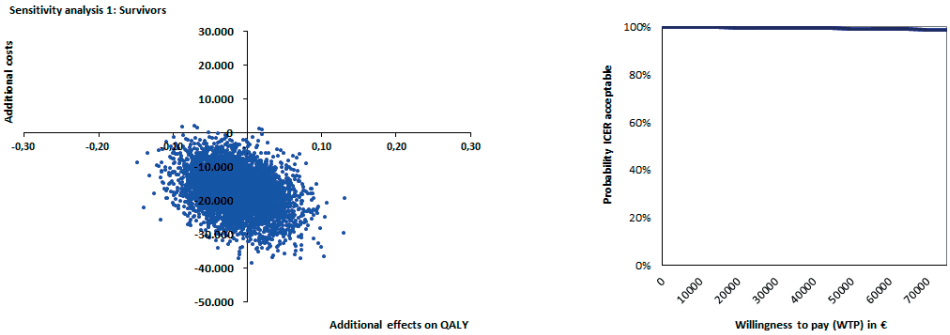
Figure 4. Sensitivity Analyses KATZ-15



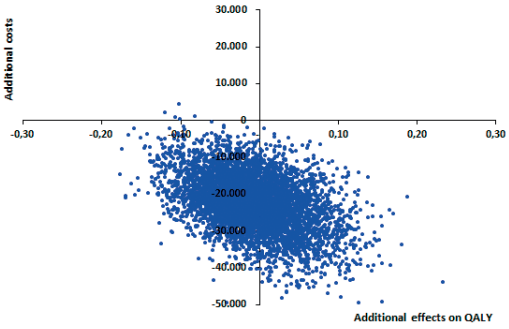


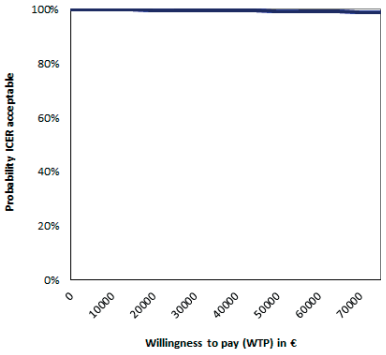
When looking at the sensitivity analyses for QALYs, all show no effects and a large decrease in costs (Table 5 and Figure 5). In the base case analysis, 56% of the bootstrapped incremental cost-utility ratios were in the dominant quadrant. In the four sensitivity analyses, the percentage of bootstrapped incremental cost-utility analyses located in the dominant quadrant ranges from 22% to 55%. Sensitivity analysis 5 (UK tariff for QALYs) causes the largest shift of ICERs towards the south-west quadrant.

Figure 5. Sensitivity Analyses QALY.

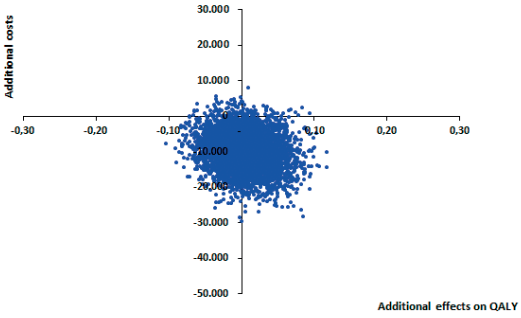


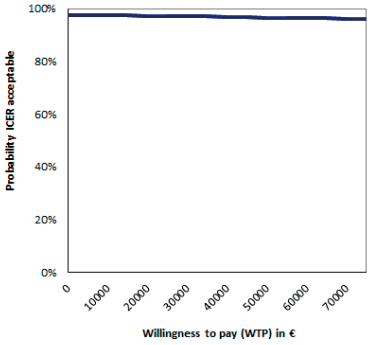
Sensitivity analysis 2: Complete cases



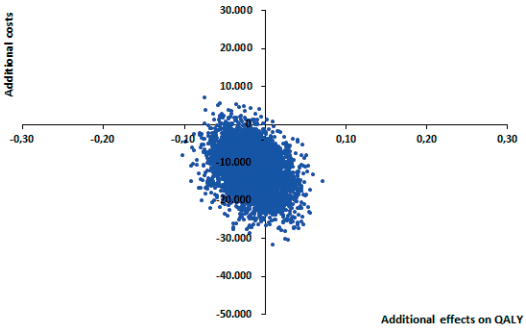


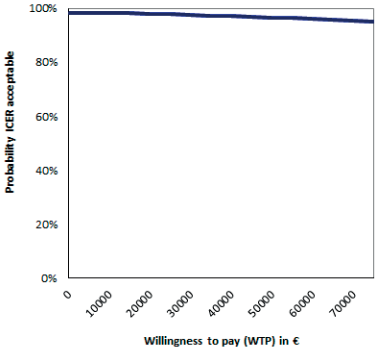
Sensitivity analysis 4: Healthcare perspective





Sensitivity analysis 5: UK Tariff for QALY





Discussion

The results of this study indicate that the integrated care pathway is a cost-effective alternative, compared to care as usual, on dependence in activities of daily living (measured with the KATZ-15). The cost-effectiveness pane shows that 97% of all bootstrapped ICERs were located in the dominant quadrant. Although no WTP threshold for dependence in activities of daily living exists, the cost-effectiveness acceptability curve for the KATZ-15 indicates that the integrated care pathway is a cost-effective intervention. Sensitivity analyses show robustness of results for this outcome measure: when only survivors or complete cases were taken into account, when changing the score on the KATZ-15 for patients who died, and when data was analysed from a healthcare perspective, the pathway remained a cost-effective intervention compared to care as usual.

With no effects but large cost savings on the outcome measure QALY, almost all bootstrapped ICERs were located south of the x-axis in the cost-effectiveness pane. When using a WTP threshold of €50,000 (moderate burden of illness), the probability of the pathway being cost-effective was 98%. The sensitivity analysis which analysed costs from a healthcare perspective showed roughly the same results as the base case analysis, whereas the other three sensitivity analyses (survivors, complete cases and the UK tariff for QALYs), all resulted in a shift of the bootstrapped ICERs from the dominant quadrant towards the south-west quadrant.

Thus, both cost-effectiveness analyses and cost-utility analyses show a large cost decrease when comparing the care as usual cohort with the care pathway cohort. This cost decrease was mainly caused by a decrease in costs related to hospital stays and stays in the geriatric rehabilitation facility. This might be an indication that due to implementation of the integrated care pathway, the possibility for timely transfer of patients to the next setting, improved. Also, the use of the triage instrument helped distinguish patients who were eligible for geriatric rehabilitation from patients who were best suited for another type of care. This may also have resulted in an improved patient flow throughout the trajectory.

Although implementation of the pathway resulted in less dependence in activities of daily living among patients, the effect on QALYs measured with the EQ-5D-3L was 0.01 in the base case analysis and ranged from -0.02 to 0.01 in the four sensitivity analyses. It can thus be concluded that implementation of the pathway did not affect quality adjusted life years among patients. A likely explanation for this lack of effect is that therapy in the geriatric rehabilitation facility is mostly directed towards regaining functional status, such as independence in (I)ADL activities and mobility.[33, 34] This means that patients are being trained to safely return home and once this goal has been reached, they will be discharged from the geriatric rehabilitation facility. Less attention is being paid to improving other domains of quality of life included in the EQ-5D-3L, such as

mood. Also, training older adults to restart social activities or other hobbies once discharged and returned home, is not regarded as a main goal of geriatric rehabilitation, though it is likely to influence overall quality of life. A last explanation for the lack of effects on QALYs is that a process evaluation conducted alongside this study (described elsewhere) showed that not all five key pathway components were fully implemented according to plan. This indicates that there is still room for improvement, for instance in the provision of information to patients and their informal caregivers, and in the quality and timing of medical discharge summaries.

Our study is the first to perform a thorough economic evaluation of an integrated care pathway in geriatric rehabilitation from a societal perspective, and to take into account the costs incurred in three different settings (hospital, geriatric rehabilitation facility and primary care). As previously mentioned, literature on studies analysing the cost-effectiveness of integrated care pathways is scarce.[19] The few studies that have assessed the clinical effects of care pathways, in terms of costs, usually reveal a decrease in costs due to shorter hospital length of stay.[16, 21, 23, 35] Still, it is not possible to compare our results to these studies as they vary in perspective (healthcare perspective or hospital perspective instead of societal perspective), patient groups and settings. Furthermore, the methodological quality of these studies was often poor and the calculation of costs, not always described.[16, 35]

Transferability of results

As the organizations involved in our study are fairly representative of the Dutch situation, we expect that our findings are applicable to other health care facilities throughout the Netherlands. Therefore, we believe that broader implementation of the integrated care pathway in the Netherlands could result in cost-savings on a wider scale. Because health care systems and patient populations differ across countries, the effects might not be directly transferable to other countries. Still, many countries recognize problems in continuity and coordination of care among older adults experiencing similar care trajectories. Therefore, elements of this integrated care pathway, such as inter-organizational collaboration and communication between providers, may be relevant outside the Netherlands as well. However, it is important for organizations to adapt the content of this integrated care pathway to local needs and settings with the help of end-users of the pathway.

Strengths and limitations

This study is subject to several limitations. First, the fact that the two cohorts were studied during different periods (the care as usual cohort in 2011-2012 and the care pathway cohort in 2013-2014) could have influenced the results. The use of the triage

instrument, a key component of the integrated care pathway, imposed stricter admission rules for geriatric rehabilitation. This influenced the type of patients who were eligible for geriatric rehabilitation. These stricter admission rules could be an explanation for the difference in baseline costs between the two cohorts. However, because we adjusted for this baseline costs difference using a regression-based method, and because there were no differences in baseline characteristics, we believe that this potential selection bias was sufficiently accounted for. Second, due to the frailty of our population, a large percentage of patients dropped out during the course of our study, and therefore, a substantial amount of data was imputed. As imputing data is subject to assumption, this might have caused bias. To minimize this bias, we used the most preferred method for handling missing data, which is mean imputation for the outcome measures KATZ-15 and QALYs and individual mean imputation to impute costs.[36] Furthermore, sensitivity analyses without imputed data showed fairly similar results, demonstrating that the results are robust. Third, healthcare costs (except hospital admissions and admissions to the geriatric rehabilitation facility), costs of assistive devices and environmental adaptations and hours of informal care were estimated based on the self-reporting of patients and informal caregivers. As self-reported measures are always susceptible to recall bias, this might have influenced the results.[37] Nevertheless, we believe that recall bias was equally present in both cohorts. Finally, to assess the intervention costs, we asked professionals to indicate the number of hours they had spent on tasks related to the integrated care pathway. However, these tasks might not be easily isolated from usual care practice. Therefore, the intervention costs might be underestimated. Because the intervention costs are low compared to the total costs (€77.60 per patient compared to the total costs of €50,791) there is little chance this could not have influenced the results.

A strength of this study is that thorough research into the cost-effectiveness of integrated care pathways is scarce, in particular, in the cost-effectiveness of care pathways crossing organizational borders. Therefore, the result of this study adds new evidence to the complex field of integrated care pathways and geriatric rehabilitation. Another strength lies in the fact that this study is performed from a societal perspective, including longitudinal observations, providing a complete view of all costs and effects.

Conclusion

From the current study it can be concluded that the integrated care pathway is a cost-effective intervention compared to care as usual. The integrated care pathway resulted in less dependence in activities of daily living and in fewer costs, illustrated by the fact that 97% of all bootstrapped ICERs were located in the dominant quadrant. As no effects were found on QALYs, 58% of all ICERs were located in the dominant quadrant and 43% in the south-west quadrant. Still, when using a WTP threshold of €50.000 per QALY, there is a 98% chance that the integrated care pathway is a cost-effective intervention when compared to care as usual. Based on these results, we recommend implementing the integrated care pathway on a wider scale. Furthermore, to improve the effects on QALYs, we advise to explore if therapy in geriatric rehabilitation could also focus on improving other quality of life-related domains, such as mood and social participation.

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Appendix 1. Integrated Care Pathway for Geriatric Rehabilitation

Setting	No.	Care pathway element
Hospital	1	If the main treatment provider believes that the patient is eligible for geriatric rehabilitation, the discharge nurses of the hospital will be consulted. Preferably, this consultation takes place well in advance of discharge.
	2	Dismissal from the hospital is preceded by a triage by a discharge nurse. Information about the patient's functional prognosis, endurability, teachability and trainability and the patient's and informal caregiver's needs and abilities needs to be gathered to make this triage decision.
	3	The triage is always performed under the responsibility of an elderly care physician from the geriatric rehabilitation facility. If the discharge nurse has doubts about eligibility of the patient for geriatric rehabilitation, the elderly care physician should be consulted.
	4	Information about functional prognosis, endurability, teachability and trainability and needs and abilities of the patient should be gathered by consulting professionals in the hospital who have been involved in the patient's care.
	5	The patient should always be asked about their needs and abilities and this should explicitly be taken into account when making the triage decision.
	6	The informal caregiver should (if applicable) be asked about their ability to provide informal care and this should explicitly be taken into account when making the triage decision.
	7	The discharge nurse should always provide oral and written information about geriatric rehabilitation to the patient and the informal caregiver.
	8	On the day the patient is discharged from the hospital, an up-to-date list of medications, a medical and nursing discharge summary and, if necessary, a discharge summary from allied health professionals should be available for the professionals in the geriatric rehabilitation facility.
Geriatric rehabilitation facility	9	In the cases where the patient discharge summaries are not available on the day the patient is admitted to the geriatric rehabilitation facility, professionals from the geriatric rehabilitation facility should contact the hospital directly.
	10	All patients with complex care needs admitted to the geriatric rehabilitation facility receive a systematic and multidisciplinary examination to determine which rehabilitation program is suitable for the patient.
	11	The patient's rehabilitation program will be established in close consultation with patient and (if applicable) informal caregiver. The patient's wishes and abilities and their informal caregiving situation will be taken into account when determining this program.
	12	Multidisciplinary meetings are organized at least twice during the patient´s stay.
	13	Patients and (if applicable) informal caregivers should always receive feedback on the issues discussed during the multidisciplinary meetings. In those cases where a modification to the patient's rehabilitation program is desirable, this will be discussed with the patient and informal caregiver.
	14	Within two weeks after admission to the geriatric rehabilitation facility, the patient and (if applicable) informal caregiver will be informed about the patient's provisional discharge date.
	15	The treatment intensity should be adjusted (decreased or increased) if this is required by the progress the patient is making.
	16	The provisional discharge date should be adjusted (decreased or increased) if this is required by the progress the patient is making.
	17	Well before discharge, the patient's home situation should be mapped out by a physiotherapist or occupational therapist.

Setting	No.	Care pathway element
	18	After the home visit, advice should be given to the patient about required adjustments and assistive devices in the home.
	19	The nurses in the geriatric rehabilitation facility should arrange home care prior to discharge of the patient.
	20	If the situation of the patient is complex, a professional of the home care organization will visit the geriatric rehabilitation facility for an intake.
	21	A professional of the home care organization will visit the geriatric rehabilitation facility for an intake if this is preferred by the patient.
	22	An up-to-date nursing discharge summary will be sent to the home care organization on the day of discharge.
	23	An up-to-date prescription for medication will be sent to the patient's pharmacy on the day of discharge.
	24	An up-to-date discharge summary by allied health professionals will be given to the patient on the day of discharge.
	25	An up-to-date medical discharge summary and medication list will be sent to the patient's general practitioner on the day of discharge.
	26	The discharge summary to the general practitioner includes information on the follow-up care advised.
Primary care	27	In those cases where the patient discharge summaries are not available to primary care on the day the patient is discharged from the geriatric rehabilitation facility, professionals from the primary care organizations should directly contact the geriatric rehabilitation facility.
	28	Once the patient is discharged from the geriatric rehabilitation facility, the nurse practitioner or district nurse in primary care should act as the patient's case manager.
All settings	29	A care pathway coordinator is appointed. The role of the care pathway coordinator is to act as a port of call for professionals involved in the pathway, to improve communication between professionals from different settings, improve continuity and coordinate care and to further streamline the pathway.
	30	At least twice per year, a meeting is organized between professionals from the hospital and from the geriatric rehabilitation facility who are involved in the triage process. The aim of this meeting is to evaluate whether or not the triage process, the medical discharge summaries and the transfer of patients between the hospital and the geriatric rehabilitation facility are satisfactory.
	31	At least once a year a meeting is organized between professionals from the geriatric rehabilitation facility and from primary care to evaluate the timing and quality of the medical discharge summaries and patient transfers.

8

GENERAL DISCUSSION

Introduction

The study described in this dissertation had three main objectives. The first objective was to describe the development and implementation of an integrated care pathway in geriatric rehabilitation for patients with complex health problems. The second objective was to study the acceptability and feasibility of the integrated care pathway and the third and final objective was to assess the (cost-) effectiveness of the integrated care pathway compared to usual care in terms of independence in activities of daily living and other secondary outcome measures. Various methods were used to meet these objectives. First, a systematic literature review was conducted to evaluate which factors are associated with home discharge after geriatric rehabilitation, an indicator of successful rehabilitation. Furthermore, the integrated care pathway was developed and implemented using the 'implementation of change' model. Second, the acceptability and feasibility of the integrated care pathway were assessed with a Delphi study among Dutch elderly care physicians and by conducting an extensive process evaluation using data collected among patients, informal caregivers and professionals. Third, the effectiveness and cost-effectiveness of the integrated care pathway were evaluated in a prospective cohort study with patients and informal caregivers. This chapter presents and discusses the main findings of this dissertation, together with the strengths and limitations of the study, implications for clinical practice and implications for future research. This chapter will end with a conclusion.

Main findings

Development and implementation of the integrated care pathway

The first objective of this study was develop and implement an integrated care pathway in geriatric rehabilitation for patients with complex health problems (Chapter 3). The integrated care pathway was developed using the first four steps of the implementation of change model of Grol & Wensing[1]: 1) the development of a specific proposal for change in practice; 2) the analysis of current care practice; 3) the analysis of the target group and setting; and 4) the development and selection of interventions/strategies for change. These four steps were completed by performing literature research, consulting experts and conducting interviews with patients, informal caregivers and healthcare professionals. Furthermore, three workgroups were established consisting of local and national stakeholders in geriatric rehabilitation. Based on the analysis of current care practice, the target group and setting and expected barriers and facilitators in the implementation phase the workgroups developed specific proposals for change. These proposals were critically discussed and finally combined into the integrated care path-

way. This pathway was gradually and systematically implemented in regular care using the selected implementation strategies. The key components of the pathway were: 1) a care pathway coordinator was appointed, acting as a link between the care providers at the hospital, in the geriatric rehabilitation facility and in primary care and focus on the optimisation of communication, handovers, and transfers; 2) a triage instrument was used by discharge nurses in the hospital; 3) all patients and their informal caregivers were actively involved in the whole rehabilitation trajectory; 4) all patient discharge summaries from the hospital to the geriatric rehabilitation facility and from the geriatric rehabilitation facility to primary care are sent on the day of discharge and were of high quality; 5) structural evaluation meetings were organised between care professionals from the hospital and the geriatric rehabilitation facility and between care professionals from the geriatric rehabilitation facility and primary care organisations.

Acceptability and feasibility of the integrated care pathway

The second objective of this dissertation was to assess the acceptability and feasibility of the integrated care pathway. Acceptability was assessed with a Delphi procedure and feasibility was assessed by conducting a process evaluation. The Delphi study (Chapter 4) was used to reach nationwide consensus among experts on the content and structure of the locally integrated care pathway. Twenty-six elderly care physicians specialised in geriatric rehabilitation indicated their level of agreement on the content of the integrated care pathway in two rounds of questionnaires. These questionnaires included statements representing the pathway. It appeared that broad consensus existed on the content and structure of the pathway, as experts agreed that 53 out of 65 statements (81.5%) were relevant for inclusion. This indicates that the pathway had the potential to be disseminated and implemented on a wider scale.
Feasibility was also assessed in a process evaluation which was performed alongside the implementation trajectory. The process evaluation focused on the questions whether or not the pathway was implemented according to plan, if patients, informal caregivers and professionals were satisfied with the pathway and which barriers and facilitators influenced implementation (Chapter 5). Data was collected using face-to-face interviews with patients, questionnaires for informal caregivers and group interviews with professionals. Furthermore, information was retrieved from registration systems, patient files and minutes of meetings. It appeared that the majority of the pathway was implemented according to plan that and patients, informal caregivers and professionals were largely satisfied with the pathway. Further attention should be paid to the timing and quality of medical discharge summaries and the triage instrument should be refined. Furthermore, as part of the component ‘active involvement of patients and informal caregivers’, patients and informal caregivers indicated a need for extra information provision about their treatment in all three settings.

(Cost-)Effectiveness of the integrated care pathway

The effectiveness of the integrated care pathway was assessed in a prospective cohort study with two cohorts of patients and their informal caregivers. The care as usual cohort was included prior to implementation of the integrated care pathway and the care pathway cohort was included after implementation of the pathway. Patients were measured three times (at admission to the geriatric rehabilitation facility, after three months and after nine months) using structured face-to-face interviews. Informal caregivers received written questionnaires using the same time frames. Multilevel analyses showed a significant difference on the secondary outcome 'frequency of performing extended daily activities among patients (measured with the FAI^2) after three $months^3$, in favour of the care pathway cohort (Chapter 6). This effect disappeared after nine months. Furthermore, significantly more patients were discharged home in the care pathway cohort compared to patients in the care as usual cohort (67% versus 89%). On the primary outcome measure among patients (independence in activities of daily living) and on all other secondary outcome measures (social participation, psychological well-being and quality of life), no effects were found. Informal caregivers experienced a lower self-rated burden after three months in the care pathway cohort. After nine months, this effect disappeared. No effects were found on the secondary outcome measures among informal caregivers (i.e. self-rated burden, quality of life and objective care burden). The cost-effectiveness and cost-utility was also assessed in this prospective cohort study (Chapter 7). Using a societal perspective and a time horizon of nine months, intervention costs, healthcare costs and patient and family costs were identified. This study showed convincing cost-effectiveness results: the total costs in the care pathway cohort were €11,379 lower than costs in the care as usual cohort and the incremental cost-effectiveness ratio (ICERs) showed that 97% of all bootstrapped ICERS were located in the dominant quadrant, indicating more effects and less costs. When looking at the cost-utility analyses where quality adjusted life years (QALYs) were used as an outcome measure, there were cost savings but no effects. Still, when using a willingness-to-pay of €50.000 per quality adjusted life year (QALY) gained (indicating a moderate burden of illness), the probability of the pathway being cost-effective was 98%.

Reflection

This paragraph provides a reflection on the implementation of the pathway, its feasibility and on the costs and effects, based on relevant studies and existing evidence in the field.

Implementation and feasibility

The development and implementation of the integrated care pathway was guided by the implementation of change framework of Grol and colleagues.[4] This framework is categorised as a process theory model. These models guide the translation of research into practice, using a number of stages or steps and stressing the importance of thorough and deliberate planning.[5, 6] Although evidence on the effectiveness of applying implementation models is limited[5], some of the individual components and strategies used in these models are proven to be effective. Several implementation studies for instance, stress the importance of involving end users in the implementation of an innovation to enhance adoption and ensure sustainability.[7-9] This was something that was explicitly done in our study where patients, informal caregivers and professionals were involved in the development and implementation of the pathway. Furthermore, in phase four of the implementation of change-framework (the development and selection of implementation strategies), several implementation strategies were chosen which were believed to facilitate implementation of the pathway on the short term but which were also understood to sustain the improvements. Examples are the use of a care pathway coordinator, monitoring and feedback of intermediate results and meetings with workgroups.[4, 10, 11] As shown in the process evaluation, this resulted in successful adoption and implementation of most of the pathway elements. Still, the process evaluation of this study also showed that the timeliness and quality of medical discharge summaries was insufficiently implemented according to plan and that the use of a triage instrument and the active involvement of patients and informal caregivers were partly implemented according to plan. A possible explanation could be that implementation strategies were chosen which were feasible and relatively easy to integrate in regular care practice. A study of Grol and colleagues however mentioned some additional successful implementation strategies for integrated care which we did not use. An example is the use of explicit protocols and electronic reminder systems,[1] which might have been effective in the improvement of the timeliness and quality of medical discharge summaries. Another implementation strategy which is proven to be effective is continuous performance feedback to individual care providers.[1] We tried to use this strategy by asking elderly care physicians to provide feedback to discharge nurses in the hospital about every single patient who, to their perspective, was incorrectly referred to the geriatric rehabilitation facility. It was expected that using this strategy would facili-

tate the use of the triage instrument and improve transparency of the triage process. However, although the elderly care physicians acknowledged the importance of giving this feedback, they failed to provide it on a structural base. This could be a reason why the use of the triage instrument was only partly implemented according to plan.
Finally, the active involvement of patients and informal caregivers was also considered partly implemented according to plan because patients and informal caregivers were not totally satisfied with the information provision in all three settings (which is considered part of the active involvement). However, 'information provision' and 'active involvement' are rather broad concepts which are not unambiguously measurable. Therefore we urged the organisations involved to more clearly specify in the integrated care pathway where, when and by whom patients were supposed to be actively involved in their rehabilitation program. However, the organisations involved were not very keen to confirm to such level of detail which might have resulted in a less commitment towards this component.
Although the implementation of change framework of Grol and Wensing is widely used, other models might also have been useful in this study. An example is the validated development model for integrated care services developed by Minkman and colleagues.[12] Another guide which would have been useful is the 'Guide for quality standards', developed by the Advisory and Expertgroup Quality Standards (AQUA)[13], providing guidance in the establishment, implementation and evaluation of quality standards. Still, due to the use of the implementation of change framework of Grol and Wensing, an integrated care pathway was developed which was based on a clear problem analysis and the involvement of end users (patient, informal caregivers and professionals). This not only increases the chance of an innovation to be successful but also to be sustainable in the long term.

Effects of the integrated care pathway

Implementation of the integrated care pathway was positively related to the frequency of performing extended activities of daily living among patients after three months, self-rated burden among informal caregivers after three months, and on the proportion of patients who were discharged home. Furthermore, implementation of the integrated care pathway resulted in a cost decline. These results are important outcomes due to various reasons. First, the performance of extended daily activities plays an important role in successful ageing in place. Staying physically active is an essential component of successful ageing but it is also important to continue participation in social, economic and cultural affairs.[14] Not only does it maintain an older persons' autonomy, it also reduces the risk of disability.[15] Second, a lower subjective burden among informal caregivers is of importance as rehabilitation gains of patients are better preserved if the informal caregiver is supportive and healthy. Furthermore, the support informal care-

givers are able to provide, highly influences if patients can remain at their own home or not.[16]

Third, an increase in the proportion of patients being discharged back to the home situation is of vital importance as well. Being admitted to a long-term care facility drastically changes people's lives as it often results in losing existing social networks and is associated with a variety of negative outcomes such as morbidity, decreasing quality of life and an increased risk of mortality.[17] Moreover, long-term care admissions place a high financial burden on society. Fourth, the ageing of the population incurs pressure on overall health care spending.[18] Therefore, the cost-effectiveness of the integrated care pathway in the face of limited health care resources is an important result, as well as a prerequisite in deciding whether or not to implement the pathway on a wider scale.

Research evidence on the feasibility and (cost-)effectiveness of integrated care pathways is not widely available, let alone evidence on integrated care pathways in geriatric rehabilitation taking into account the three different settings (hospital, geriatric rehabilitation facility and primary care organisations). Because of this scarcity of evidence, our study is a unique and valuable contribution into the field of integrated care pathways in geriatric rehabilitation. However, it makes a comparison of our results with related studies in the field difficult. As mentioned in the introduction chapter of this dissertation, studies into the effects of care pathways are usually related to one specific diagnosis group in the hospital, such as patients with stroke[19], joint replacements[20, 21], heart failure treatment[22] or asthma.[23] These pathways are mostly focused on the assessment, diagnosis and multidisciplinary treatment of specific conditions instead of on the process of care. These studies demonstrate shorter hospital stays, less readmissions and improved organisation of care.[20-23] However, some of the authors also stress that due to methodological limitations, the results should be treated with caution.[19, 20] Two other studies into the effects of integrated care pathways not specifically designed for one patient group and which take into account at least two different settings (e.g. hospital and primary care) conclude that these pathways lead to a more efficient organisation of care and in improved care coordination.[24, 25] However, these studies only looked at process-related indicators, rather than specific patient outcomes such as the ones measured used in our study. When looking into the broader literature of integrated care however, there are some interesting similarities. A systematic literature review investigating the effectiveness of integrated care programs for chronically ill patients performed by Ouwens and colleagues showed positive effects of integrated care programs on functional health status.[26] This review also demonstrated that integrated care programs decreased hospital admissions and length of stay. Patient satisfaction and quality of life were also measured in some studies but did not show any significant effects. Finally, this review suggested financial benefits of integrated care programs.[26] The effects of these integrated care programs on functional health status and cost reductions are in line with the results of our study and it seemed that overall, integrated care programs are positively related to improved clinical and organisational outcomes.[27]

Methodological considerations

This paragraph discusses the methodological strengths and limitations of our total study related to the study design, the study population and the generalizability of the results.

Study design

The randomised controlled trial (RCT) is considered to be the most powerful study design due to the high internal validity and because the effects are less prone to bias.[28] However, the evidence obtained by RCTs comes from highly controlled settings and this makes it more difficult to translate this evidence into clinical practice. Furthermore, RCTs are not flexible and do not allow modifications in treatment procedures during the trial.[29] As the goal of this study was not only to assess the effects of the integrated care pathway but also its development and implementation, various strategies were used to increase the likelihood of successful implementation and sustainability of the pathway. One of these strategies was the gradual implementation of the pathway in regular care and the possibility for modification and adaption of the pathway based on experience, new evidence or changed legislation.[6] Therefore, performing an RCT was not possible in our study. For this reason a prospective cohort study was chosen as the study design to assess the process, effects and economic impact of the integrated care pathway.
The uncontrolled nature of this design is something which was thus explicitly chosen for. A disadvantage of the uncontrolled nature of this design is that the observed changes over time can be caused by the intervention but also by other factors.[29] Probably the main external factor influencing the results of this study was the time lag in enrolment of the two cohorts (prior to implementation of the pathway and after implementation of the pathway). The period in between the inclusion of the two cohorts was accompanied by various legislative changes in the healthcare system in the Netherlands. There was for instance a nationwide change towards stricter admission criteria for geriatric rehabilitation in 2013. Fortunately, these nationwide stricter eligibility criteria were in line with the goals of our integrated care pathway, which was to increase the proportion of patients discharged home after geriatric rehabilitation. Therefore, these stricter eligibility criteria were used as a facilitator during the development and implementation of the triage instrument. The use of this triage instrument was thus a fundamental part of the integrated care pathway but this has possibly also resulted in some baseline differences between the two cohorts related to the triage criteria (such as differences in teachability, trainability, patient preferences or informal care possibilities). However, these criteria were not measured in our study and therefore the two cohorts cannot be compared with regards to these characteristics. As shown in the effect evaluation (Chapter 6), no differences between the cohorts were found on various other baseline characteristics and on the primary and secondary outcome

measures. Therefore it is likely that the effects of the pathway were not only caused by changed eligibility criteria but that other pathway elements have contributed to these results as well.
Although the sequential enrolment of the two groups made it more challenging to prove causality, advantages of this design should also be mentioned. If a quasi-experimental study design was chosen where the control group was recruited at a different geriatric rehabilitation facility, we would have to deal with various confounding factors related to the study setting, the geographical area and the professionals involved. Due to the sequential enrolment of the two groups, these confounding factors were negligible.

Overall, the weaknesses of observational study designs should thus be kept in mind when interpreting our results. It should however be noted that utmost precision was exerted when executing the study, for example by performing an extensive process evaluation alongside the effect evaluation and measuring patients and informal caregivers at three points in time.

Study population

As mentioned in the general introduction of this dissertation, four patient groups in geriatric rehabilitation can be distinguished: patients with stroke, trauma orthopaedic patients, elective orthopaedic patients and patients with complex health problems. The study population of this study were older people with complex health problems and (very often) multiple morbidities. In general, patients in this group are very frail which resulted in challenges in the recruitment and follow-up measurements in our study population. Firstly, during the inclusion period of the care as usual cohort, 91 patients with complex health problems were admitted to the geriatric rehabilitation facility but only 70% met the inclusion criteria for participation. In the care pathway cohort, this percentage was 66%. Main reasons for not meeting the inclusion criteria were that patients died before inclusion, they were (terminally) ill, suffered from cognitive problems or were readmitted to the hospital. These numbers can be regarded as a confirmation of the high frailty level of patients with complex health problems admitted to the geriatric rehabilitation facility. Furthermore, out of the patients eligible for participation, 69% participated in the care as usual cohort and 59% participated in the care pathway cohort. Again, major reasons to decline participation in both cohorts were that patients indicated being too ill to participate or because participation was perceived as too burdensome. Despite extension of the inclusion period in the care pathway cohort with five months due to low inclusion numbers, the response rate remained low. This could have influenced the results as low-powered studies produce more false-negatives than high-powered studies, resulting in difficulties in detecting a true effect.[30] Furthermore, the drop-out rate during the study period, mostly caused by the death of pa-

tients, illness and cognitive problems, was also high (61% and 39%, respectively). Because we had no reason to believe that the drop-outs were missing due to reasons we did not observe, it was assumed that the data was missing at random. Therefore, multilevel analyses were used to handle these missing data, decreasing the risk of bias due to missing values.

The informal caregivers of patients with complex health problems were a second study population in this study. Recruitment of these informal caregivers appeared to be challenging as well, mostly because many patients indicated not having an informal caregiver prior to hospital admission (53% of all patients without a participating informal caregiver in the care as usual cohort and 41% in the care pathway cohort). Other main reasons for not participating were that the informal caregiver was not interested (24% and 31%, respectively) or, in the care pathway cohort, the patient did not want to burden their informal caregiver (13%). Again, this resulted in a small sample size of 26 informal caregivers in the care as usual cohort and 28 informal caregivers in the care pathway cohort. As previously mentioned, this small sample size might have led to difficulties in detecting a true effect[30] and this should also be taken into account when interpreting the results. Finally, in longitudinal studies there is a chance of selective drop-out. We tried to account for this by including various covariates in the model, as well as by analysing the total dataset of patients and informal caregivers, including the ones who dropped out of the study.

Generalizability

The integrated care pathway in geriatric rehabilitation was developed in the Maastricht region and is comprised of specific elements applicable to the local culture, resources and networks. Therefore, it was believed that not all elements of the pathway might be feasible or acceptable in other regions in the Netherlands. However, the results of the Delphi study demonstrated that nationwide there was broad consensus on the content of the pathway and therefore, it has the potential to be disseminated and implemented on a wider scale in the Netherlands (Chapter 4). Still, the response rate in this Delphi study was 46%. Although there is no indication of selective response, the possibility of bias cannot be ignored

Furthermore, because the integrated care pathway was developed and gradually implemented in regular care, leaving room for optimisation based on changing needs and circumstances, the results of the effect evaluation and economic evaluation represent 'real world' results. Therefore, we believe these results are fairly generalizable to other comparable geriatric rehabilitation facilities throughout the Netherlands and that implementing the pathway in other regions could results in both better effects and in cost savings.

As health care systems across countries are often substantially different from each other, more caution should be exercised when generalizing the effects of the pathway towards different countries and populations. Still, the key elements of the pathway focus on improved transfer of patients and structural collaboration between different care organisations; these topics increasingly receive priority in international clinical practice and research.[31-35] Because these elements are considered requirements for providing high-quality care internationally[26], they could also be implemented abroad. It does remain important, however, to tailor these elements to the local situation before implementation to better meet the needs and circumstances of the population.
Lastly, the pathway appeared to result in a cost decrease, mainly caused by a shorter length of stay in the hospital and a shorter length of stay in the geriatric rehabilitation facility. However, it is debatable whether or not this cost decrease at the individual (micro) level will actually be accompanied by an overall (macro level) cost reduction. This phenomenon is acknowledged in an article of Getzen who explains the "regulatory balloon metaphor" of *"pushing in at one point causes a bulge somewhere else with no real change in total volume"*.[36] We did not measure if length of stay in the two settings also resulted in empty hospital beds or a decrease in the number of beds in the geriatric rehabilitation facility. Therefore, caution should also be taken when concluding that this cost reduction at the micro level also resulted in a macro level cost reduction.

Implications for clinical practice

As the results of our study show that implementation of the integrated care pathway leads to a higher frequency of performing extended daily activities among patients after three months and to a significantly larger proportion of patients being discharged back to the home situation after geriatric rehabilitation, to a lower self-rated burden among informal caregivers after three months and to lower costs, we first recommend implementation of the pathway on a wider scale in the Netherlands. Results of the Delphi study showed there was broad nationwide consensus on the content and structure of the pathway, which will probably facilitate dissemination. Still, as the content of the pathway was adjusted to the local needs and circumstances of patients and professionals in the Maastricht area, it is not recommended to simply adopt the pathway in the current form. Instead, organisations can use the pathway as a draft when developing and implementing their own pathways. To increase the chance of sustainability of the pathway, our second recommendation is to thoroughly prepare these local implementation processes with the involvement of patients, informal caregivers and professionals. Based on an analysis of the degree to which the current care provision deviates from the desired care provision, the current pathway can be adjusted to the local situation and the most suitable implementations strategies for implementation of this pathway can to be chosen. In this phase it is also important to verify if the pathway is finan-

cially sustainable (e.g. are the resources available to have someone fulfil the tasks of the care pathway coordinator, is there room for structural evaluation meetings, etcetera). Second, besides the fact that the promising results give rise to wider implementation of the pathway, the results of the process evaluation, the effect evaluation and the economic evaluation also give reason for further optimisation of the current pathway. The process evaluation (Chapter 5) demonstrated that not all elements of the pathway were implemented according to plan and in the paragraph 'reflection', possible explanations were given. Based on these explanations, it is recommended examine which additional implementation strategies can be used to ensure the medical discharge summaries are transferred on time and have high quality. As the use of electronic reminder systems was explicitly mentioned as a successful implementation strategy in the study of Grol and colleagues[1], the option to make use of this strategy should be explored. To improve the triage process, it is recommended to interview the elderly care physicians and to discover which barriers they experience in providing continuous feedback to discharge nurses about the triage process. Based on this information, the implementation strategy should be tailored to the elderly care physicians' needs. Finally, to improve the active involvement of patients and informal caregivers, it is recommended that the organisations involved formulate all pathway elements according to 'smart criteria' (specific, measurable, assignable, realistic and time-related) and monitor their adherence to these elements.

The effect evaluation (Chapter 6) showed the pathway did not affect independence in activities of daily living, social participation, psychological well-being and quality of life among patients. Also, the effects on the secondary outcome measure 'performance of extended daily activities' disappeared after nine months. As previously mentioned, performing extended daily activities plays an important role in successful ageing. However, various authors argue that successful ageing is more comprehensive than only being independent in activities of (extended) daily living and add concepts such as good mental function, the absence of depression or good quality of life when operationalizing successful ageing. Also, various studies found an association between social participation and preservation of function and between social participation and an increased probability of recovery. These studies thus emphasise the importance of the other secondary outcome measures of the effect evaluation. It is therefore recommended to involve patients and informal caregivers when critically reflecting on the content of the integrated care pathway, and to discuss which elements are currently missing that could improve patient outcomes after geriatric rehabilitation. Furthermore, it is important to extend the effects on the FAI among patients and the SRB among informal caregivers beyond a period of three months. An explanation for the disappearance of effects could be that not all primary care providers (homecare providers, general practitioners, physiotherapists, occupational therapists) were aware of the content of the integrated care pathway, or implemented them in daily practice. Although all profes-

sional associations of the primary care providers were informed and involved in the project, the number of professionals providing primary care is large. They are not always affiliated members of professional organisations and many providers are self-employed. Together with the regional dispersion of these providers, it is likely that we were unable to reach them all. Therefore, it is recommended to closely monitor which providers did not implement the pathway in daily practice and to use targeted implementation strategies to improve implementation of the pathway in primary care.

Third, this integrated care pathway was specifically designed for the patients with complex health problems. However, as this integrated care pathway is focused on the process of care and not on the nature of the rehabilitation treatment it is believed this pathway might be applicable for the elective orthopaedics and trauma orthopaedics groups as well. Therefore, it is recommended to explore if the pathway can also be used in these other groups. As there are already specific stroke pathways available and implemented throughout the Netherlands, it is essential to investigate if, and to what extent, these two pathways overlap and could possibly be merged.
Fourth, according to Grol and colleagues, the ability to adapt to the external environment is a prerequisite for sustainability.[1] Therefore, it is important to keep in mind that the integrated care pathway is not static but can, and should, be adapted and rearranged to respond to the ever changing health care environment. In the near future, this means for instance monitoring developments in the provision of ambulatory geriatric rehabilitation and, where possible, aligning with these developments.
Finally, a wide variety of innovations are currently being implemented in health care which influence the organisation of care. An example is the rising number of care coordinators structuring the care processes for patients suffering from chronic diseases such as dementia. Again, it is essential to avoid overlap with these innovations and to seek collaboration as to minimise burden on the patient and their informal caregivers and to keep the healthcare system transparent.

Implications for future research

First, our study population was very frail, which caused challenges in the recruitment and retention of our study participants. Various strategies were used to increase participation and limit drop-out rates such as conducting face-to-face interviews by a trained research assistant instead of sending a postal questionnaire and offering flexibility in the time and place of the interviews (the interviews were usually conducted at the patients' home). Using the last strategy was also recommended by Provencher and colleagues, who identified challenges and strategies in the recruitment and retention of frail older adults in research studies.[37] Nonetheless, it appeared to be difficult to include and maintain participants in our study. As the conclusions of Provencher et al were predominantly based on community-dwelling older adults[37], more research is needed into barriers related to study participation among frail older patients in general.

Second, the subjective care burden among informal caregivers decreased after three months. However, after nine months this effect disappeared and no effects were found on the secondary outcome measures among informal caregivers. More research is needed to investigate what the main reason(s) or risk factors are for objective and subjective burden among informal caregivers of patients admitted to, and discharged from the geriatric rehabilitation facility. After identification of these risk factors, tailored interventions might be included in the integrated care pathway to decrease their burden.

Third, the pathway appeared to result in a cost decrease, mainly caused by a shorter length of stay in the hospital and a shorter length of stay in the geriatric rehabilitation facility. However, as mentioned in the 'methodological considerations' paragraph, it is uncertain if this cost decrease at the individual (micro) level will actually be accompanied by an overall (macro level) cost reduction. Therefore, it is advisable to perform more macro cost analyses in the future.

Finally, due to a lack of evidence in the field of integrated care pathways within geriatric rehabilitation, the results of our study cannot be compared with related studies in the field. Therefore it is recommended to further evaluate the effects of the integrated care pathway when implementing the pathway in different patient groups (e.g. elective orthopaedic and trauma orthopaedic patients) and in different regions (e.g. in the whole of south-Limburg). These evaluations should both focus on process related factors, such as the view of professionals about improved communication, collaboration and quality of care, as well as on its (cost-)effectiveness regarding patient outcomes. Because these results will add knowledge to the evidence base of integrated care pathways in geriatric rehabilitation, more robust conclusions about the effectiveness of these pathways can be drawn.

Conclusion

An integrated care pathway in geriatric rehabilitation was developed and implemented in Maastricht, the Netherlands, focusing on communication, triage and transfer of older patients with complex health problems between hospital, geriatric rehabilitation facility and primary care organisations. The pathway appeared to be acceptable, largely feasible, effective on two secondary outcome measures among patients and effective on the primary outcome measure among informal informal caregivers and cost-effective. Furthermore, patients, informal caregivers and professionals were mostly satisfied with the pathway though not all key pathway components were implemented according to plan. Based on these results, it is recommended to further optimise the pathway with respect to the elements which were not fully implemented according to plan and to disseminate and implement the pathway on a wider scale.

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SUMMARY

Acute illnesses or disease exacerbations can result in hospital admissions among frail older adults. These hospital admissions are often accompanied by functional decline and deterioration in self-care abilities. As a consequence, it is not possible for all community-dwelling older adults to directly return home after hospital discharge. These patients can be temporarily admitted to a geriatric rehabilitation facility where they receive multidisciplinary rehabilitation treatment to restore functional status and independence. The main goal of geriatric rehabilitation is to enable older adults to return to their initial home situation. However, because these older adults transfer between multiple care settings (hospital, geriatric rehabilitation facility and primary care) and require care from different healthcare providers, this resulted in various challenges.
First, the triage for geriatric rehabilitation in the hospital was not optimal. Although patients are only eligible for geriatric rehabilitation if it is expected that they are able to return home after discharge, until a couple years ago, a considerable number of patients were not able to return home after geriatric rehabilitation and were permanently admitted to long-term care facilities. Second, patients and their informal caregivers were not sufficiently involved in decisions regarding their rehabilitation trajectory. Third, the patient discharge summaries from the hospital to the geriatric rehabilitation facility and from the geriatric rehabilitation facility to primary care organisations often lacked sufficient quality and/or were sent too late. Lastly, as a large variety of professionals and organisations were involved in this rehabilitation trajectory, good coordination of care between the different settings appeared to be difficult.
For these reasons, an integrated care pathway in geriatric rehabilitation was developed in the Maastricht region, the Netherlands. This pathway aimed to improve continuity and coordination of care across these settings. This dissertation reports on the development, implementation, acceptability, feasibility and effects of this integrated care pathway in geriatric rehabilitation.

Chapter one introduces the topics of this dissertation. It provides an overview of the content and structure of geriatric rehabilitation and elaborates on the challenges in the geriatric rehabilitation trajectory. Furthermore, it introduces the concept of integrated care pathways and explains how integrated care pathways can be used to tackle the challenges in this trajectory. The chapter ends with the three objectives of this study: 1) to develop and implement an integrated care pathway in geriatric rehabilitation for the group of patients with complex health problems; 2) to assess the acceptability and feasibility of the integrated care pathway; and 3) to analyse the (cost-) effectiveness of the integrated care pathway in geriatric rehabilitation compared to usual care, with respect to dependence in activities of daily living among patients, self-rated burden among informal caregivers and various secondary outcome measures.

Chapter two describes the results of a systematic review into the factors influencing home discharge in older patients admitted to an inpatient rehabilitation unit (all diseases except stroke). Eighteen studies were included in this review. This study revealed that the factors significantly associated with home discharge after inpatient rehabilita-

tion were younger age, non-white ethnicity, being married, better functional and cognitive status and the absence of depression. It is recommended to assess these influencing factors at admission to a rehabilitation unit because it can help professionals make a reliable prediction of discharge destination and to tailor the rehabilitation treatment to the needs of the patients and their families.

Chapter three reports on the development and implementation process of the integrated care pathway in geriatric rehabilitation for the group of patients with complex health problems. In the Netherlands, patients in geriatric rehabilitation facilities are categorized in four groups: patients with stroke, trauma orthopaedics, elective orthopaedics and the residual, often referred to as patients with complex health problems. These patients often suffer from multi-morbidity, mostly involving cardiac problems, problems with the respiratory system, neurological problems, internal problems and oncological problems. The integrated care pathway was developed for this group of patients with complex health problems, using three multidisciplinary workgroups. These workgroups consisted of local and national stakeholders in geriatric rehabilitation, such as healthcare professionals, representatives of national interest groups and representatives of patients and informal caregivers. The various steps that were taken in the process of developing and implementing the pathway are described, together with the outcome, which is the integrated care pathway. The five key components of the pathway are 1) the appointment of a care pathway coordinator, 2) the use of a triage instrument in the hospital, 3) the active engagement of patients and informal caregivers in the rehabilitation trajectory, 4) the timeliness and quality of patient discharge summaries and 5) the organisation of structural evaluation meetings between professionals of the hospital, the geriatric rehabilitation facility and primary care organisations.

Chapter four describes the acceptability of the integrated care pathway. The objective of this study was to reach national consensus on the locally developed integrated care pathway in geriatric rehabilitation. To reach this objective, a two-round Delphi study was used with elderly care physicians specialized in geriatric rehabilitation as experts. These elderly care physicians are specialised in the care of frail older people with chronic, complex diseases and in the Netherlands, they are the main treatment providers in geriatric rehabilitation. The experts had to indicate their level of agreement on 65 statements representing the integrated care pathway. All statements which did not gain consensus (the statements with an Inter Quartile Range ≥1) were redistributed to participants in round two. In total, 26 experts finished the two questionnaires. Is appeared that after the second round, 92% of all statements reached consensus and the content of 82% of all statements was considered relevant to be included in the pathway. Hence, it can be concluded that there is nationwide consensus on the pathway among elderly care physicians and therefore it has the potential to be disseminated and implemented on a wider scale.

Chapter five describes the feasibility of the integrated care pathway which was assessed by an extensive process evaluation. This process evaluation used a mixed meth-

ods design, including both qualitative and quantitative data collection methods. Feasibility was assessed using the theoretical process-evaluation framework of Saunders and colleagues. This process evaluation focused on whether the integrated care pathway was implemented according to plan, to what extent patients, informal caregivers and professionals were satisfied with the pathway and which barriers and facilitators influenced implementation of the pathway. Results showed two out of the five main components of the pathway were fully implemented according to plan (the appointment of a care pathway coordinator and the organisation of structural evaluation meetings) and two components were largely implemented according to plan (the use of a triage instrument in the hospital and the active involvement of patients and informal caregivers in the rehabilitation trajectory). Finally, the timeliness and quality of medical discharge summaries was not sufficiently implemented according to plan. Patients, informal caregivers and professionals were satisfied with the pathway, although patients and informal caregivers also indicated that professionals needed to provide more information about their treatment in all three settings (in the hospital, the geriatric rehabilitation facility and in primary care). These results suggest the pathway was largely feasible but there is room for further optimization of the pathway as well.

Chapter six and *chapter seven* discuss the results of a prospective cohort study with two cohorts of patients and informal caregivers. The two cohorts were recruited in the geriatric rehabilitation facility where the pathway was implemented (in the Maastricht area). The first cohort of patients (n=43) and informal caregivers (n=26) was included prior to implementation of the integrated care pathway and the second cohort of patients (n=106) and informal caregivers (n=28) was included after implementation of the integrated care pathway. C*hapter six* describes the effects of the integrated care pathway on dependence in activities of daily living (such as self-care and mobility), extended activities of daily living (such as leisure and outdoor activities), social participation, psychological well-being, quality of life and discharge location among patients. Furthermore, the effects on self-rated burden, quality of life and objective care burden among informal caregivers are described. Data was collected through structured face-to-face interviews with patients, and, for informal caregivers, through written questionnaires. Multilevel analyses showed a significant improvement among patients in the frequency of performing extended daily activities after three months (adjusted mean difference of 4.14; p=0.014). This effect disappeared after nine months. A logistic regression analysis also showed that a larger proportion of patients in the care pathway cohort was discharged to the home situation compared to patients in the care as usual cohort (89% versus 67%, p=0.004). Finally, informal caregivers in the care pathway cohort had a lower self-rated burden after three months (adjusted mean difference of -1.54; p=0.05). This effect also disappeared after nine months. No effects were found on the other outcome measures among patients and informal caregivers.

Chapter seven describes the cost-effectiveness and cost-utility of the integrated care pathway compared to care as usual from a societal perspective and using a time horizon

of 9 months. The costs consisted of healthcare costs (including intervention costs) and patient and family costs. The outcome measure for the cost-effectiveness analysis was dependence in activities of daily living (measured with the KATZ-15) and the outcome measure for the cost-utility analysis was Quality Adjusted Life Years (QALYs, measured with the EQ-5D-3L). Both costs and effects were measured using structured face-to-face interviews with patients, written questionnaires among informal caregivers and by retrieving information from registration systems in the hospital and in the geriatric rehabilitation facility. Results show that after nine months, patients in the care pathway cohort were less dependent in performing activities of daily living. No difference was found between the two groups on the outcome measure QALY. Furthermore, the average societal costs in the care as usual cohort were significantly higher compared to the average societal costs in the care pathway cohort (€62,170 versus €50,791; CI= -22,090, -988). The lower costs are mainly the result of shorter hospital stays (39.2 vs. 27.0 days) and shorter stays in the geriatric rehabilitation facility (79.1 vs. 55.4 days). Implementation of the integrated care pathway in geriatric rehabilitation thus resulted in more effects on the KATZ-15 and in fewer costs. Therefore, the integrated care pathway is a cost-effective alternative compared to care as usual. No differences were found between the two groups on QALY scores. When using a willingness-to-pay (WTP) of €50.000 per QALY (indicating a moderate burden of illness), the pathway has a 98% chance of being cost-effective. Sensitivity analyses show largely comparable results, indicating robustness of results. For these reasons, we recommend disseminating and implementing the integrated care pathway on a wider scale.

Chapter eight provides and reflects on the main findings of this study. Furthermore, it discusses the methodological considerations, together with its implications for clinical practice and future research. The main conclusion of this study is that the integrated care pathway for geriatric rehabilitation is acceptable, largely feasible and effective in improving the frequency of performing extended daily activities among patients after three months. Implementation of the integrated care pathway also resulted in a larger proportion of patients being discharged home after geriatric rehabilitation, in a lower self-rated burden among informal caregivers after three months and in cost savings. Therefore it is recommended to disseminate and implement the integrated care pathway on a wider scale. Extra attention should be paid to the components of the pathway which were not fully implemented according to plan and targeted implementation strategies should be used to improve implementation of the pathway in primary care. Finally, various recommendations for future research are provided.

SAMENVATTING

Acute aandoeningen of verergering van chronische ziekten leiden vaak tot ziekenhuisopnames onder kwetsbare ouderen. Deze ziekenhuisopnames kunnen vervolgens gepaard gaan met afname van functionele status en een verminderd vermogen tot zelfzorg. Om deze reden is het niet voor alle zelfstandig wonende ouderen mogelijk om na een ziekenhuisopname direct terug te keren naar huis. Deze patiënten kunnen tijdelijk worden opgenomen in een instelling voor geriatrische revalidatiezorg waar multidisciplinair gewerkt wordt aan herstel van functionele capaciteit en zelfredzaamheid. Het doel van geriatrische revalidatiezorg is ouderen in staat te stellen om terug te keren naar de thuissituatie.
In dit traject van opname in een ziekenhuis, opname in een instelling voor geriatrische revalidatiezorg en ontslag naar de thuissituatie, krijgt men te maken met verschillende zorgorganisaties en een grote verscheidenheid aan zorgverleners. Dit leidt tot een aantal uitdagingen in het traject voor betrokken zorgverleners, cliënten en hun naasten. Allereerst bleek de triage voor geriatrische revalidatiezorg in het ziekenhuis niet optimaal. Hoewel geriatrische revalidatiezorg alleen bedoeld is voor patiënten bij wie de verwachting bestaat dat ze terug konden keren naar de thuissituatie, bleek dat tot een aantal jaar geleden een groot percentage patiënten na ontslag uit de geriatrische revalidatiezorg te worden opgenomen in een instelling voor langdurige zorg. Ten tweede werden patiënten en mantelzorgers onvoldoende betrokken bij beslissingen in het revalidatietraject. Een derde uitdaging was dat de overdrachten vanuit het ziekenhuis naar de instelling voor geriatrische revalidatiezorg en vanuit de instelling voor geriatrische revalidatiezorg naar de eerste lijn vaak van onvoldoende kwaliteit waren en/of te laat werden verstuurd. Ten slotte is een grote verscheidenheid aan zorgverleners en organisaties betrokken in het revalidatietraject, hetgeen de coördinatie en continuïteit van zorg tussen de verschillende organisaties bemoeilijkt.
Deze uitdagingen zijn de aanleiding geweest om een zorgpad geriatrische revalidatiezorg te ontwikkelen. Dit zorgpad is gericht op het verbeteren van de coördinatie en continuïteit van zorg in het geriatrische revalidatietraject van ziekenhuisopname tot terugkeer naar de thuissituatie. In dit proefschrift wordt de ontwikkeling, implementatie, aanvaardbaarheid, uitvoerbaarheid en (kosten-)effectiviteit van dit zorgpad geriatrische revalidatiezorg beschreven. Onderstaand wordt de inhoud van de verschillende hoofdstukken uit dit proefschrift samengevat.

Hoofdstuk één introduceert het onderwerp van dit proefschrift. Dit hoofdstuk gaat in op de inhoud en structuur van geriatrische revalidatiezorg en benoemt de uitdagingen in het traject van ziekenhuisopname, geriatrische revalidatiezorg en terugkeer naar de thuissituatie. Daarnaast introduceert dit hoofdstuk het concept zorgpaden en geeft het weer op welke manier zorgpaden kunnen worden ingezet om de continuïteit en coördinatie van zorg te verbeteren. Het hoofdstuk eindigt met de drie doelstellingen van dit proefschrift: 1) het ontwikkelen en implementeren van een zorgpad geriatrische revalidatiezorg voor de groep patiënten met complexe gezondheidsproblemen; 2) het bepalen van de aanvaardbaarheid en praktische uitvoerbaarheid van dit zorgpad; en 3)

het vaststellen van de (kosten-)effectiviteit van het zorgpad geriatrische revalidatiezorg in vergelijking met de reguliere zorgverlening.

Hoofdstuk twee beschrijft de resultaten van een systematische literatuurstudie naar actoren die invloed hebben op ontslag naar de thuissituatie na opname in een revalidatie instelling onder oudere patiënten. De factoren die op basis van 18 geïncludeerde studies invloed bleken te hebben op ontslag naar de thuissituatie waren lagere leeftijd, niet-blanke etniciteit, getrouwd zijn, betere functionele en cognitieve status en de afwezigheid van een depressie. Op basis van deze resultaten wordt aangeraden om deze factoren mee te nemen bij opname van een patiënt in een instelling voor geriatrische revalidatiezorg. Op deze manier kunnen zorgverleners beter voorspelen of een patiënt kan terugkeren naar de thuissituatie en kan de revalidatiebehandeling goed worden afgestemd op de wensen en behoeften van de patiënt en familie.

Hoofdstuk drie beschrijft de ontwikkeling en implementatie van het zorgpad geriatrische revalidatiezorg voor de groep patiënten met complexe gezondheidsproblemen in de regio Maastricht. In Nederland worden patiënten in de geriatrische revalidatiezorg ingedeeld in vier categorieën: CVA, trauma orthopedie, electieve orthopedie en de overige patiënten, ook wel patiënten met complexe gezondheidsproblemen genoemd. Patiënten in deze laatste groep zijn vaak multimorbide en hebben te maken met een verscheidenheid aan aandoeningen zoals cardiovasculaire aandoeningen, problemen met het ademhalingsstelsel, neurologische aandoeningen, interne problematiek en oncologische aandoeningen. Het zorgpad is ontwikkeld voor deze groep patiënten met complexe gezondheidsproblemen. Bij de ontwikkeling van het zorgpad waren drie multidisciplinaire werkgroepen betrokken. Deze werkgroepen bestonden uit lokale en nationale stakeholders in de geriatrische revalidatiezorg, zoals zorgverleners, vertegenwoordigers van nationale belangenorganisaties en vertegenwoordigers van patiënten en mantelzorgers. In dit hoofdstuk worden de verschillende stappen beschreven die genomen zijn in het ontwikkelproces en wordt de inhoud van het zorgpad weergegeven. De vijf speerpunten van het zorgpad zijn: 1) de aanstelling van een zorgpadcoördinator, 2) het gebruik van een triage-instrument in het ziekenhuis, 3) de actieve betrokkenheid van patiënten en mantelzorgers in het revalidatieproces, 4) de tijdigheid en kwaliteit van overdrachten, en 5) de organisatie van structurele overlegvormen tussen zorgverleners van het ziekenhuis, de geriatrische revalidatiezorg en eerstelijns zorgorganisaties.

Hoofdstuk vier beschrijft de resultaten van een Delphi studie. Het doel van deze studie was het bereiken van nationale consensus over de inhoud van het lokaal ontwikkelde zorgpad geriatrische revalidatiezorg (aanvaardbaarheid). Om dit doel te bereiken is een Delphi studie uitgevoerd met specialisten ouderengeneeskunde die de kaderopleiding geriatrische revalidatiezorg hebben gevolgd. Deze specialisten ouderengeneeskunde zijn de hoofdbehandelaars in de instellingen voor geriatrische revalidatiezorg. De deelnemers hebben een vragenlijst gekregen met 65 stellingen die de inhoud van het zorgpad geriatrische revalidatiezorg weergeven. Vervolgens werd gevraagd of ze op een

schaal van 1-5 aan konden geven in hoeverre ze het eens waren met de stellingen. De stellingen waar geen consensus over was bereikt (stellingen met een Inter Quartile Range ≥1) werden opnieuw voorgelegd aan de deelnemers in de tweede ronde. In totaal hebben 26 specialisten ouderengeneeskunde de twee vragenlijsten ingevuld. Resultaten laten zien dat na de tweede ronde consensus was over 92% van alle stellingen en dat de deelnemers de inhoud van 82% van alle stellingen relevant vonden om te includeren in het zorgpad. Hieruit blijkt dat er landelijke consensus is over het zorgpad en dat het zorgpad het potentieel heeft om verspreid en geïmplementeerd te worden op grotere schaal.

De praktische uitvoerbaarheid van het zorgpad is geëvalueerd in een uitgebreide procesevaluatie die wordt beschreven in *hoofdstuk vijf*. Binnen deze procesevaluatie is gebruik gemaakt van verschillende kwalitatieve en kwantitatieve methoden van dataverzameling. De praktische uitvoerbaarheid van het zorgpad werd vastgesteld door gebruik te maken van het theoretische procesevaluatie-framework van Saunders en collega's. Door gebruik te maken van dit framework is onderzocht of het zorgpad was geïmplementeerd volgens plan, in hoeverre patiënten, mantelzorgers en zorgverleners tevreden waren met het zorgpad en welke bevorderende en belemmerende factoren implementatie van het zorgpad hebben beïnvloed. Resultaten laten zien dat twee van de vijf speerpunten van het zorgpad volledig waren geïmplementeerd volgens plan (de aanstelling van een zorgpadcoördinator en het organiseren van structurele overlegvormen) en twee speerpunten grotendeels waren geïmplementeerd volgens plan (het gebruik van het triage-instrument in het ziekenhuis en het actief betrekken van patiënten en mantelzorgers in het revalidatietraject). De tijdigheid en kwaliteit van de medische overdrachten, ten slotte, was nog onvoldoende geïmplementeerd volgens plan. Daarnaast gaven patiënten, mantelzorgers en zorgverleners aan over het algemeen tevreden te zijn met het zorgpad. Wel waren patiënten en mantelzorgers van mening dat er meer aandacht moest worden besteed aan de informatievoorziening over hun behandeling in zowel het ziekenhuis als in de instelling voor geriatrische revalidatiezorg en de eerste lijn. Op basis van deze resultaten kan worden geconcludeerd dat het zorgpad grotendeels uitvoerbaar was maar dat er ook ruimte is voor verdere optimalisatie.

In *hoofdstuk zes* en *hoofdstuk zeven* worden de resultaten beschreven van een prospectieve cohort studie met twee cohorten van patiënten en mantelzorgers. De twee cohorten zijn geworven bij de instelling voor geriatrische revalidatiezorg waar het zorgpad is geïmplementeerd (regio Maastricht). Het eerste cohort van patiënten (n=43) en mantelzorgers (n=26), het reguliere zorg cohort, was geïncludeerd vóór implementatie van het zorgpad. Het tweede cohort van patiënten (n=106) en mantelzorgers (=28), het zorgpad cohort, was geïncludeerd na implementatie van het zorgpad. In h*oofdstuk zes* worden de effecten van het zorgpad beschreven op de afhankelijkheid in het uitvoeren van dagelijkse activiteiten (zoals zelfzorg en mobiliteit), ondernomen bredere dagelijkse activiteiten (zoals hobby's en activiteiten buitenshuis), sociale participatie, psychisch welbevinden, kwaliteit van leven en ontslaglocatie van patiënten. Daarnaast worden

effecten beschreven op ervaren belasting, kwaliteit van leven en objectieve zorglast van mantelzorgers. Data zijn verzameld door het uitvoeren van gestructureerde face-to-face interviews met patiënten en door het versturen van schriftelijke vragenlijsten naar deelnemende mantelzorgers. Multilevel analyses laten zien dat patiënten in het zorgpad cohort na drie maanden significant meer bredere dagelijkse activiteiten uitvoerden (gecorrigeerd gemiddeld verschil van 4,14; p=0,014). Dit verschil verdween na negen maanden. Daarnaast laat een logistische regressieanalyse zien dat een groter percentage patiënten in het zorgpad cohort ontslagen werd naar de thuissituatie in vergelijking met patiënten in het reguliere zorg cohort (89% tegenover 67%, p=0,004). Ten slotte ervaarden mantelzorgers in het zorgpad cohort na drie maanden een lagere ervaren belasting (gecorrigeerd gemiddeld verschil van -1,54; p=0,05). Dit verschil verdween eveneens na negen maanden. Er zijn geen effecten gevonden op de andere uitkomstmaten bij patiënten en mantelzorgers.

Hoofdstuk zeven richt zich op de kosteneffectiviteit en kosten-utiliteit van het zorgpad geriatrische revalidatiezorg in vergelijking met reguliere zorgverlening. Zowel de kosteneffectiviteit als de kosten-utiliteit is vastgesteld vanuit een maatschappelijk perspectief en met een tijdshorizon van 9 maanden. De gemeten kosten bestonden uit zorgkosten (inclusief interventiekosten) en patiënt- en familiekosten. De uitkomstmaat voor de kosteneffectiviteitsanalyse was afhankelijkheid in het uitvoeren van dagelijkse activiteiten (gemeten met de KATZ-15) en de uitkomstmaat voor de kostenutiliteitsanalyse waren Quality Adjusted Life Years (QALYs, gemeten met de EQ-5D-3L). Kosten en effecten zijn gemeten in de face-to-face interviews met patiënten, schriftelijke vragenlijsten bij mantelzorgers en door informatie te halen uit registratiesystemen van het ziekenhuis en de instelling voor geriatrische revalidatiezorg. Resultaten na 9 maanden laten zien dat patiënten in het zorgpad cohort gemiddeld minder afhankelijk zijn in het uitvoeren van dagelijkse activiteiten. Op de QALYs wordt geen verschil tussen het reguliere zorg cohort en het zorgpad cohort gemeten. Daarnaast zijn de gemiddelde kosten in het reguliere zorg cohort significant hoger (€62.170 versus €50.791; betrouwbaarheidsinterval = -22.090, -988) dan in het zorgpad cohort. Dit verschil in kosten is voornamelijk veroorzaakt door kortere ligduur in het ziekenhuis (39,2 versus. 27,0 dagen) en kortere ligduur in de instelling voor geriatrische revalidatiezorg (79,1 versus. 55,4 dagen). Implementatie van het zorgpad heeft dus op de KATZ-15 gezorgd voor meer effecten en minder kosten waardoor het zorgpad een kosteneffectief alternatief is vergeleken met de reguliere zorgverlening. Op de uitkomstmaat QALY heeft implementatie van het zorgpad geleid tot geen verschil op de effecten en tot minder kosten. Wanneer wordt uitgegaan van €50.000 per QALY die de maatschappij bereid is te betalen (de 'Willingness-to-pay' bij een bepaalde ziektelast) blijkt dat kans dat het zorgpad kosteneffectief is, 98% is. De uitgevoerde sensitiviteitsanalyses laten overwegend dezelfde resultaten zien, waaruit kan worden geconcludeerd dat de resultaten robuust zijn. Om deze redenen raden we aan om het zorgpad op bredere schaal te verspreiden en te implementeren.

Hoofdstuk acht reflecteert op de belangrijkste bevindingen van het onderzoek. Daarnaast wordt aandacht besteed aan de methodologische beperkingen van het onderzoek en worden er aanbevelingen gedaan voor de praktijk en toekomstig onderzoek. De belangrijkste conclusie van dit proefschrift is dat het zorgpad geriatrische revalidatiezorg aanvaardbaar en grotendeels uitvoerbaar is gebleken, en dat het zorgpad effectief is in het uitvoeren van meer bredere dagelijkse activiteiten onder patiënten na drie maanden. Daarnaast heeft implementatie van het zorgpad geleid tot een groter percentage patiënten dat na geriatrische revalidatiezorg ontslagen is naar de thuissituatie, tot een lagere ervaren zorglast na drie maanden onder mantelzorgers, en tot een kostenverlaging. Om deze redenen raden we aan om het zorgpad op bredere schaal te implementeren in de reguliere zorg. Tevens wordt aangeraden om bij de implementatie nadrukkelijk aandacht te besteden aan de onderdelen van het zorgpad die in de regio Maastricht niet (volledig) geïmplementeerd zijn volgens plan, en om gerichte strategieen in te zetten om implementatie van het zorgpad in de eerste lijn te bevorderen. Ten slotte worden verschillende aanbevelingen gedaan voor toekomstig onderzoek.

VALORISATION

In this thesis, the process of developing and implementing an integrated care pathway in geriatric rehabilitation for patients with complex health problems is described, together with its acceptability, feasibility and its (cost-) effectiveness. This chapter elaborates on the societal relevance of this study and its value for different stakeholders. Furthermore, activities to be undertaken to disseminate the study results are discussed.

Societal relevance

The number of community-dwelling older adults in the Netherlands who are admitted to a geriatric rehabilitation facility after hospital discharge is increasing. Whereas this number was approximately 27,000 in 2008, this number exceeded 47,000 in 2014.[1] This increase is probably a consequence of the Dutch 'ageing in place' policy objective, reflected by both housing policies aiming to keep older adults to live in their own homes as long as possible, as well as the welfare state reform towards the participation society. In such a society, involvement of all different societal groups in essential, as well as taking responsibility to be an active member of this society.

Due to the 'ageing in place' policy objective, a larger proportion of older adults remain community-dwelling instead of being admitted to a long-term care facility. Therefore, a larger number of patients are in need geriatric rehabilitation after hospital admission. This should enable them to safely return to their original home situation. Because patients who need geriatric rehabilitation transfer between hospital, geriatric rehabilitation facility and primary care, they are vulnerable for gaps in coordination and continuity of care during these transitions. These gaps relate to a lack of timely and safe transfers, which can result in adverse events, dissatisfaction with the care received, readmission or permanent placement in long-term care facilities.[2, 3] Therefore, it is essential to improve continuity and coordination of care in this trajectory.[4] In the project described in this thesis, we tried to improve continuity and coordination of care by developing and implementing an integrated care pathway in geriatric rehabilitation for older adults transferring between the hospital, the geriatric rehabilitation facility and community care. The results of the effect evaluation and the cost-effectiveness analysis showed an reduced length of stay in the hospital and a reduced length of stay in the geriatric rehabilitation facility, an increase in the proportion of patients discharged home (instead of being permanently admitted to a long-term care facility), an increase in the frequency of performing extended daily activities among patients and a decrease in self-rated burden among informal caregivers. The shorter length of stay in the hospital and the geriatric rehabilitation facility also resulted in substantial cost savings. Taking all these results together, this pathway is considered important to promote ageing in place. Therefore, it is recommended to implement the integrated care pathway in regular care.

Stakeholders

The first target group benefiting from wider implementation of the integrated care pathway are the older patients and their informal caregivers. Yearly, over 47,000 patients transfer between the hospital and the geriatric rehabilitation facility. The majority of these patients are also discharged home where they receive primary care. Wider implementation of the pathway might lead to more patients being discharged home where they are more successful in performing extended daily activities. Also, the informal caregivers of these patients might experience a lower burden.

The integrated care pathway for geriatric rehabilitation was developed for patients with complex health problems, which is one out of the four classified patient groups in geriatric rehabilitation in The Netherlands. The other three groups are patients with a stroke, trauma orthopeadics and elective orthopeadics. Because the integrated care pathway is primarily focused on improving the logistical and organizational processes of care, it can probably be helpful for improving the care pathways of the other diagnosis groups in geriatric rehabilitation as well. Implementation here could also lead to a larger group of patients and informal caregivers taking advantage of the aforementioned effects.

Another target group benefiting of dissemination of the integrated care pathway on a wider scale are health care professionals working in hospitals, geriatric rehabilitation facilities and in primary care. These healthcare professionals often experience a high workload. When patient transfers between the organisations are not adequately organised, this might lead to extra work (e.g. when patient information is lacking or when patients are not adequately informed), incomprehension and disturbed relationships between the different healthcare providers. This not only can lead to decreased job satisfaction but it might also lead to stress among patients and informal caregivers and to inadequate quality of patient care. Professionals indicated that after implementation of the integrated care pathway, there was more and better communication between the different organisations, possible barriers were structurally dealt with and mutual understanding improved.

The last group of stakeholders who probably will benefit of wider implementation of the pathway are healthcare financers, such as health insurance companies and local municipalities. As shown in the economic evaluation, implementation of the integrated care pathway resulted in cost savings. These cost savings are mainly the result of a shorter length of stay in both the hospital and the geriatric rehabilitation facility. Furthermore, more patients are discharged back to the home situation instead of being institutionalized. As living at home is a cheaper alternative compared to living in a nursing home, this may be of interest for those who are in charge of financing this type of care. Therefore, implementation of the integrated care pathway in regular care might result in cost savings on a wider scale.

Dissemination of study results

The results of this study are currently being disseminated in a follow-up study entitled 'Sustainable implementation of the integrated care pathway in geriatric rehabilitation'. In this project, researchers work together with various stakeholders (i.e. patients, informal caregivers, professionals, healthcare insurers and local municipalities) to optimize the integrated care pathway on elements which were not fully implemented yet, and on improving elements of the pathway which were recommended by patients and informal caregivers during the process evaluation. Furthermore, this study focuses on the dissemination of the pathway and on reaching sustainable implementation of the pathway in regular care. This project aims to achieve the following objectives:

1. Optimization and (practical and financial) sustainability of the integrated care pathway;
2. Dissemination of the integrated care pathway in the south of the province of Limburg;
3. Country-wide availability of the integrated care pathway and its corresponding implementation materials.

Objective 1: Optimization and sustainability of the integrated care pathway

This objective constitutes of two parts: reaching optimization and practical sustainability of the pathway on the one hand, and reaching financial sustainability of the pathway on the other.

The optimization and practical sustainability of the pathway focuses on implementation of elements of the integrated care pathway which were not fully implemented yet, and on improving elements of the pathway which were recommended by patients and informal caregivers during the initial study. Also, we will make use of interviews with patients, a focus group with informal caregivers and group interviews with healthcare professionals to determine additional proposals for improvement. The results of these interviews will be discussed in a workgroup consisting of health care professionals directly involved in the care provision along the pathway and representatives of patients and informal caregivers. Based on these results, new elements will be added to the integrated care pathway and existing elements might be changed. Besides developing and/or changing elements of the integrated care pathway, local implementation strategies will be developed in order to reach successful implementation and sustainability of the optimised pathway.

As structural financing is often regarded as a requisite for sustainability of an innovation, reaching structural financing of the integrated care pathway within the Dutch healthcare system is an important part of the first objective of the project 'Sustainable

implementation of the integrated care pathway in geriatric rehabilitation'. We aim to reach structural financing by involving the possible financers of the pathway (i.e. the largest healthcare insurers in the region and local municipalities) in a workgroup. In this workgroup, all costs, benefits and effects of the integrated care pathway will be presented and discussed. Furthermore, a business case will be developed including all essential information for financers to make a decision about structural financing. This business case will be developed in collaboration with the possible financers and with representatives of patients and informal caregivers and will be disseminated to all healthcare insurers and other relevant stakeholders.

Objective 2: Dissemination of the integrated care pathway in the south of Limburg

This objective focuses on dissemination of the integrated care pathway among four organisations providing geriatric rehabilitation in the south of Limburg (MeanderGroep, Cicero Zorggroep, Zuyderland and Sevagram). These four organisations are chosen based on their partnership with the Academic Collaborative Centre on Care for Older People (AAC-OP). This academic collaborative centre is a formal multidisciplinary network consisting of Maastricht University, seven large long-term care organisations and Zuyd University of Applied Sciences.
As a first step, the four previously mentioned organisations will be visited by the researcher of this project to provide information about the integrated care pathway. After these visits, one or more meetings will be organized where the different organisations come together (both the organization who implemented the integrated care pathway and the four organisations previously mentioned). During these meetings, information will be provided about the content of the pathway and about the steps needed to implement (elements of) the pathway. Also, information will be exchanged about best practices in the different organizations. It is expected that this will lead to dissemination of the pathway. The organisations will also be offered help if they want to take further steps in the implementation of the pathway.

Objective 3: Country-wide availability of the integrated care pathway and its corresponding implementation materials

In order to disseminate the integrated care pathway on a wider scale (i.e. in the whole of the Netherlands), it is important to keep the integrated care pathway and its corresponding implementation materials available for care networks in the whole country. These materials should also be kept available on a structural base (also after termination of the current project). Therefore, we will invite several national interest groups which are involved as project partners (i.e. Actiz as representative of residential and

home care organisations, Patient Federation Netherlands as representative of patients, Verenso as the representative of elderly care physicians and 'BeterOud', the website of the National Care for the Elderly Program) if they are willing to take ownership of the materials. This includes keeping the materials available on their websites, as well as regularly updating the materials. If they are not willing or capable to take ownership of the materials, alternatives will be explored.

We hope that the outcomes of this study on the 'Sustainable implementation of the integrated care pathway in geriatric rehabilitation' will contribute to the structural integration of the care pathway in regular health care for older people in The Netherlands.

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ABOUT THE AUTHOR

Irma Everink was born on the 21st of December 1985 in Budel-Schoot, the Netherlands. After completing her secondary school 'het Elzendaalcollege' in Boxmeer in 2004, she started with the bachelor General Health Sciences at Maastricht University. She completed her bachelor degree in 2007 and enrolled in the master 'Health Services Innovation' this same year. After graduating in 2009 she went traveling through South-East Asia, Australia and New Zealand. Shortly after her return in the Netherlands she started a second master at the Maastricht Graduate School of Governance. She completed the master 'Public Policy and Human Development' in 2011. The following years, Irma combined two jobs. She worked in a home care organisation (GroenekruisDomicura) and at Zuyd University of Applied Sciences (department of Technology in Care). There she worked as a junior researcher on two projects: lifestyle monitoring and care television. In 2013 she started her PhD trajectory at Maastricht University under the supervision of Prof. dr. Ruud Kempen, Prof. dr. Jos Schols and dr. Jolanda van Haastregt. This PhD project was focused on the development, implementation and evaluation of an integrated care pathway in geriatric rehabilitation and resulted in this thesis. Irma is currently being employed as a post-doctoral researcher at the department of Health Services Research where she works on a project focused on the sustainable implementation of the integrated care pathway in geriatric rehabilitation. Next to this, she works as a researcher on the 'National Prevalence Measurement of Quality of Care' project (Landelijke Prevalentiemeting Zorgkwaliteit).

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LIVING LAB IN AGEING AND LONG-TERM CARE

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This thesis is part of the Living Lab in Ageing and Long-Term Care, a formal and structural multidisciplinary network consisting of Maastricht University, 7 long-term care organizations (Cicero Zorggroep, Envida, Mosae Zorggroep, MeanderGroep Zuid-Limburg, Sevagram, Vivantes and Zuyderland) and Zuyd University of Applied Sciences, all located in the southern part of the Netherlands. In the Living Lab we aim to improve quality of care and quality of life for older people via a structural multidisciplinary collaboration between research, policy, education and practice. Practitioners (such as nurses, physicians, psychologists, physio- and occupational therapists), work together with managers, researchers, students, teachers and older people themselves to develop and test innovations in long-term care.

ACADEMISCHE WERKPLAATS OUDERENZORG ZUID-LIMBURG

Dit proefschrift is onderdeel van de Academische Werkplaats Ouderenzorg Zuid-Limburg, een structureel, multidisciplinair samenwerkingsverband tussen de Universiteit Maastricht, 7 zorgorganisaties (Cicero Zorggroep, Envida, Mosae Zorggroep, MeanderGroep Zuid-Limburg, Sevagram, Vivantes en Zuyderland) en Zuyd Hogeschool. In de werkplaats draait het om het verbeteren van de kwaliteit van leven en zorg voor ouderen. Zorgverleners (zoals verpleegkundigen, verzorgenden, artsen, psychologen, fysio- en ergotherapeuten), beleidsmakers, onderzoekers, studenten en ouderen zelf wisselen kennis en ervaring uit. Daarnaast toetsen en evalueren we vernieuwingen in de dagelijkse zorg. Praktijk, beleid, onderzoek en onderwijs gaan hierbij hand in hand.

PHD-THESES LIVING LAB IN AGEING AND LONG-TERM CARE / PROEFSCHRIFTEN ACADEMISCHE WERKPLAATS OUDERENZORG ZUID-LIMBURG

Irma Everink. Geriatric rehabilitation. Development, implementation and evaluation of an integrated care pathway for older patients with complex health problems. 2017

Ramona Backhaus. Thinking beyond numbers. Nursing staff and quality of care in nursing homes. 2017

MartIn Van Leen. Prevention of pressure ulcers in nursing homes, a big challenge. 2017
Mariëlle Daamen-Van der Velden. Heart failure in nursing home residents. Prevalence, diagnosis and treatment. 2016

Armand Rondas. Prevalence and assessment of (infected) chronic wounds. 2016

Hanneke Beerens. Adding life to years. Quality of life of people with dementia receiving long-term care. 2016 (Cum Laude)

Donja Mijnarends. Sarcopenia: a rising geriatric giant. Health and economic outcomes of community-dwelling older adults with sarcopenia. 2016

Tanja Dorresteijn. A home-based program to manage concerns about falls. Feasibility, effects and costs of a cognitive behavioral approach in community-dwelling, frail older people. 2016

Basema Afram. From home towards the nursing home in dementia. Informal caregivers' perspectives on why admission happens and what they need. 2015

Noemi Van Nie-Visser. Malnutrition in nursing home residents in the Netherlands, Germany and Austria. Exploring and comparing influencing factors. 2014

Esther Meesterberends. Pressure ulcer care in the Netherlands versus Germany 0-1. What makes the difference? 2013

Math Gulpers. EXBELT: expelling belt restraints from psychogeriatric nursing homes. 2013

Hilde Verbeek. Redesigning dementia care. An evaluation of small-scale homelike care environments. 2011

Judith Meijers. Awareness of malnutrition in health care, the Dutch perspective. 2009

Ans Bouman. A home visiting program for older people with poor health. 2009.

Monique Du Moulin. Urinary incontinence in primary care, diagnosis and interventions. 2008

Anna Huizing. Towards restraint free care for psychogeriatric nursing home residents. 2008

Pascalle Van Bilsen. Care for the elderly, an exploration of perceived needs, demands and service use. 2008

Rixt Zijlstra. Managing concerns about falls. Fear of falling and avoidance of activity in older people. 2007

Sandra Zwakhalen. Pain assessment in nursing home residents with dementia. 2007