Lian Tijsen

A Challenging Rehabilitation Environment

CREATE a team self-evaluation tool

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Colophon
The work in this thesis was conducted at the department of Public Health and Primary Care of the Leiden University Medical Center.

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Academic network for research in elderly care
The studies in this thesis took place in the University Network for the Care Sector South Holland (UNC-ZH). In this network, the Leiden University Medical Center (LUMC) collaborates structurally with 12 elderly care organizations in South Holland (Marente, Pieter van Foreest, Florence, Topaz, Argos Zorggroep, Saffier, Laurens, Zonnehuisgroep Vlaardingen, Woonzorgcentra Haaglanden, Aafje, ActiVite, Haagse Wijk- en Woonzorg).

Caregivers, policy makers, researchers, students, residents and relatives work together to improve the quality of care and quality of life for vulnerable older people. The UNC-ZH is a regional platform, inspirator and learning network for innovation in long-term care. Research, education and training, and practice are closely related.

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A challenging rehabilitation environment - CREATE a team self-evaluation tool

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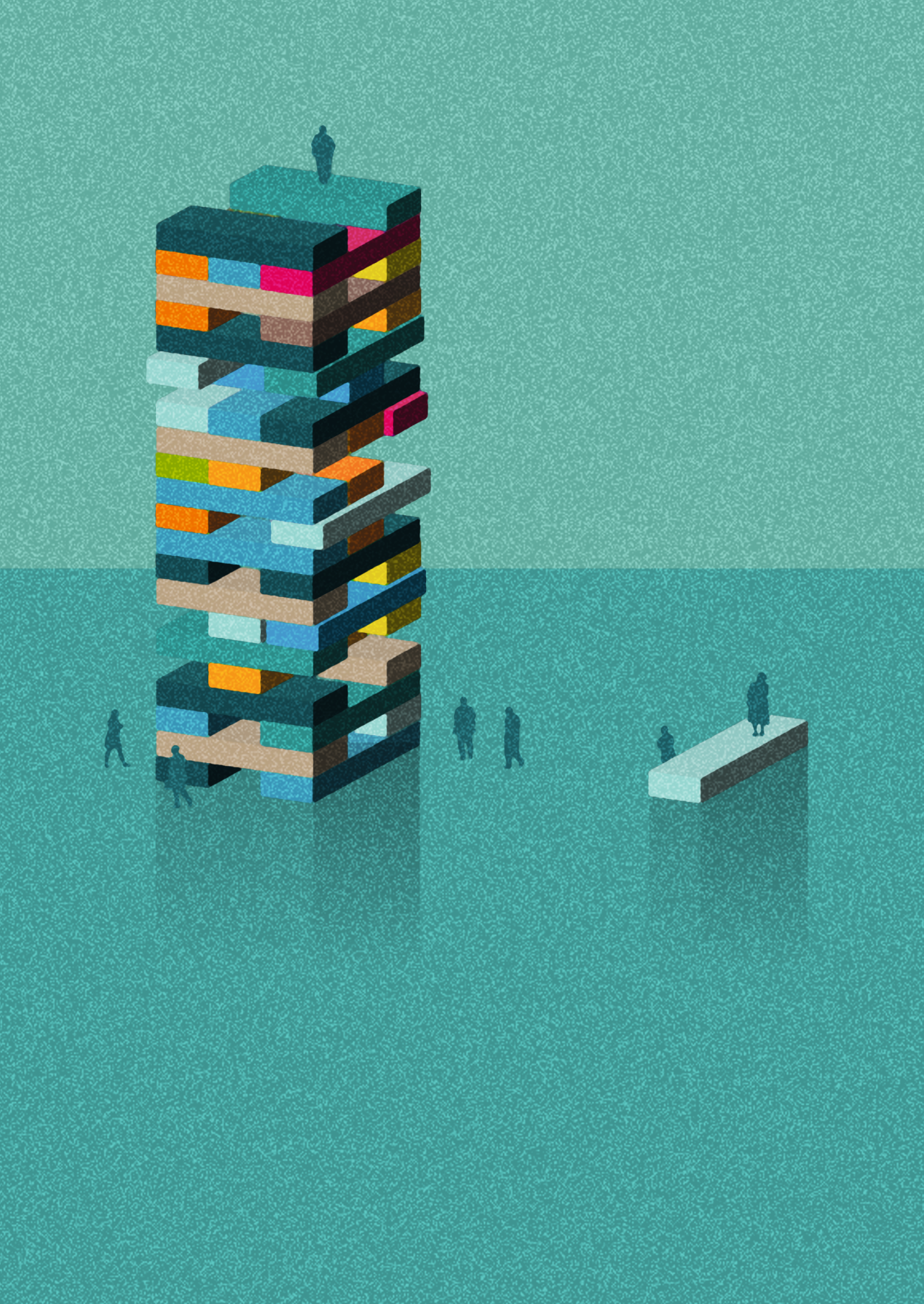

Chapter 1

General Introduction

Casus

In 2005, when I was in the first year of my physiotherapy education, my grandfather fell off his bike. This resulted in a intertrochanteric hip fracture, for which he received a gamma nail. At that time geriatric rehabilitation in the Netherlands was not yet as organized as it is today, which is why my grandfather went home for his rehabilitation. At that time he lived in a care home where there was continuous care if needed.

The therapies he needed were provided by therapists who visited the care home a few times a week. My grandfather received a schedule with exercises and walking distances to practice every day. As a physiotherapy student, I took him for a daily walk when it was not yet safe to do this independently, and I was present at most of his therapy sessions.

The therapists structurally reported my grandfather's progress to the nursing staff, so they could take this into account in the amount of support they offered my grandfather. Due to the lack of challenge, my grandfather had few therapeutic activities outside of therapy sessions.

After ten weeks of rehabilitation, my grandfather was able to walk without walking aid and was independent in his activities of daily living.

Background

Worldwide the population is aging, which is, among other things, reflected in an increased life expectancy. Since 1990, life expectancy has increased by almost 9 years to 72.8 years globally in 2019 and is expected to increase further to approximately 77.2 years globally in 2050.[1] This aging also shows in the number of persons aged 65 years or over. In 1980 there were 258 million people aged 65 years or over, a number that has grown to 771 million in 2022 and is expected to grow to 994 million by 2030 and 1.6 billion by 2050. This results in a rise of the share of the global population aged 65 years or above from 10% in 2022 to 16% in

2050.[1] For western countries these numbers are even higher, with in 2022 a share of 17-19% of those aged 65 or above, which is expected to rise to 24-27% in 2050.[1]

This ageing of the population is associated with an increase in multimorbidity and geriatric syndromes such as frailty, impaired cognition, incontinence, and gait and balance problems, leading to an increased risk of disabilities with impairments in functioning in daily life.[2-4] Frailty and multimorbidity increases the likelihood of adverse outcomes, such as hospitalization, functional decline and mortality.[5] Common reasons for hospitalization in older persons are cardiac events, infections, fall related injuries, stroke, cancer, or medical/surgical interventions.[6] These indications may result in older persons not being able to return home after hospitalization. In addition, during hospitalization 40% of the frail older persons may experience hospitalization-associated disabilities, which can also result in being unable to return home.[5,6] Reasons for not being able to return home are, among other things, reduced independence in performing activities of daily living, and reduced strength and endurance. Rehabilitation can facilitate older persons returning home after hospitalization by supporting them in their recovery. Therefore, in total 11% of those aged ≥ 75 years are referred to a (geriatric) rehabilitation unit after hospitalization.[7]

Geriatric Rehabilitation

Geriatric Rehabilitation is a relatively young field of interest in both clinical practice and scientific research and is recently defined as "a multidimensional approach of diagnostic and therapeutic interventions, the purpose of which is to optimize functional capacity, promote activity and preserve functional reserve and social participation in older people with disabling impairments."[8] Despite this consensus definition, there are international differences in the way geriatric rehabilitation is offered and in inclusion criteria. For example, difference exist regarding from what age someone has access to geriatric rehabilitation or if there has to be an acute decline before admission.[8,9] These differences make it difficult to define worldwide numbers of older rehabilitants in geriatric rehabilitation. In the Netherlands, 54.910 persons were referred to geriatric rehabilitation in 2021, which is organized by nursing homes.[10] With a total number of 3.5 million persons over

65 years, approximately 1.5% of the Dutch population over 65 years was referred for geriatric rehabilitation in 2021.[11]

Geriatric rehabilitation has both short term and long term beneficial effects on functional improvement, preventing admission to nursing homes and reducing mortality.[12] In 2012, on average 73% of the rehabilitants in geriatric rehabilitation are discharged to their own living situation, although this percentage varies depending on the diagnosis between 63% for rehabilitants after stroke and 81% for rehabilitants with an orthopedic trauma.[13]In 2019 the average percentage of rehabilitants able to go back to their own living situation has already risen to 80%.[14]

In 2019 about 30% of the rehabilitants in Dutch geriatric rehabilitation were rehabilitating after an orthopedic trauma, 17% after stroke and 14% after elective orthopedic surgery. Other indications included e.g. rehabilitation for organ disorders like cardiac arrest or respiratory diseases, amputation or oncology. The average length of stay on a rehabilitation ward was 43 days for all diagnoses groups, varying between 30 days after elective surgery and 67 days after amputation.[15]

Geriatric rehabilitation in the Netherlands is typically provided by an interdisciplinary team. This rehabilitation team in general consists of nurses, elderly care physicians, physiotherapists, and occupational therapists. Depending on the rehabilitants' needs and goals a psychologist, social worker, dietitian, or speech and language therapist can also be part of the team.[4,13] The average amount of treatment hours for rehabilitants in geriatric rehabilitation depends on the diagnosis group and is related to the length of stay, varying between 21 hours in 30 days after elective surgery and 55 hours in 67 days after amputation.[15]

Introduction of the research topic

Studies from about ten years ago showed that during inpatient rehabilitation for stroke the amount of time spent on therapeutic activities ranged from 9% to 56% of the working hours, with rehabilitants with higher functional levels spending more time on therapeutic activities.[16-22] These differences between the percent-

ages can partly be explained by which activities are counted as therapeutic (e.g. mealtimes, communication, activities of daily living).

Similar results were found for rehabilitants with orthopedic problems of the lower extremities in the inpatient rehabilitation, who were able to walk independently or with support. This group of rehabilitants walked on average only 8 min/day and none of them achieved 10 mins of moderately intensive physical contiguous activity.[23]

This low activity level of these rehabilitants is worrying, because more therapy time appears to be associated with positive outcomes such as return home, functional recovery and a shorter length of stay, and an decrease of therapy time is associated with return to hospital or death.[17,23-35]

Towards a challenging rehabilitation environment

(Socio-) therapeutic climate is a common concept in psychiatry since the nineteen eighties and focusses among other things on therapeutic goals related to the ability to re-adapt to the home situation, on group processes within a treatment group, on problem orientated approach, and on the influence of staff characteristics.[36-38] This broad perspective on treatment is well secured in psychiatry. The combination of the social, physical, and organizational environment is also used to achieve therapeutic goals in nursing home residents with dementia.[39] These positive outcomes give inspiration to apply this broad approach in other fields.

This broad perspective on treatment was brought to geriatric rehabilitation in the Netherlands by Marieke Terwel in 2011 with the publication of the book: *"Everything is rehabilitation: rehabilitation after a stroke in the Laurens therapeutic climate".*[40] This book described e.g. the importance of shared rehabilitation goals, methods for interdisciplinary group training, functional training moments during daily activities (task-oriented training), and methods to encourage rehabilitants to work independently on their rehabilitation.

Rehabilitation wards in the Netherlands adapted this concept enthusiastically and the concept is no longer only used for stroke rehabilitants.[41-44] Although a scien-

tific basis for this concept is lacking and there are differences in interpretation of aspects relevant for this concept. Aspects that are mentioned as being related to this concept concern for instance increasing therapy time, group training, patient-regulated exercise, family participation and task-oriented training. Because there is no conceptualization of the concept of therapeutic climate, it is not clear to what extent this contributes to effective and efficient rehabilitation.

In this thesis we do not use the term 'Therapeutic Climate', but use the name "challenging rehabilitation environment" (CRE; Dutch: Uitdagend Revalidatieklimaat) for the described concept. As the concept contains more than the contact moment with therapists, we also want to recognize the work of other disciplines such as nurses in the rehabilitation process. The concept describes the whole environment in which the rehabilitation takes place, and it is intended to challenge rehabilitants to get the optimal rehabilitation results. Therefore, this name seems to describe the concept best.

In this thesis we use the word rehabilitants when talking about persons/patients who are rehabilitating. These persons are trying to adapt to, and self-manage their current condition. In line with the ideas of Huber et al. on positive health, the term 'rehabilitant' is more appropriate.[45]

Aim and outline of this thesis

This thesis describes the results of the CREATE study (Challenging REhAbiliTation Environment). The overall aim of the CREATE study was to conceptualize CRE, and to develop a tool to support rehabilitation wards in improving their CRE. For this purpose the following research questions were addressed:

1. Which aspects are important in a challenging rehabilitation environment and how can these be combined in a conceptualization?

2. To which extent is a team self-evaluation tool feasible to support rehabilitation wards by implementing a challenging rehabilitation environment?

The studies described in this thesis follow one another and jointly work towards this conceptualization and tool.

Chapter 2 describes a narrative review into aspects known to be relevant for CRE, and therefore answers the question what is known in literature about a challenging rehabilitation environment. C**hapter 3** describes the perspectives of rehabilitants and informal caregivers regarding CRE. In focus groups and telephone interviews, the participants were asked about themes they thought were relevant for CRE and the content of these themes. Participants were currently rehabilitating or had recent experience with rehabilitation.

In **Chapter 4** the perspectives of professionals regarding CRE were examined. In a qualitative study consisting of focus groups and workshops, over 180 professionals gave their perspectives on themes relevant to CRE and on the content of these themes. The participating professionals all worked in (geriatric) rehabilitation, both nationally and internationally. The professional positions of the participants included e.g. researchers, physicians, nurses, and paramedics.

Using the concept mapping methodology, **chapter 5** combines the knowledge of chapter 2 to 4 in an evidence-based conceptualization of CRE. With the input of nursing staff, (para)medical staff, and rehabilitants and informal caregivers, a statistical consensus was achieved regarding the conceptualization. This led to a broadly supported conceptualization, which combines evidence-based, expert-based, and experience-based knowledge, and therefore answers the first research question.

In **chapter 6**, the conceptualization from chapter 5 has been converted into a team self-evaluation tool, and the second research question is answered. This tool was pilot tested on five rehabilitation wards in the Netherlands. Interdisciplinary teams of these wards performed the protocol of this tool and completed an evaluation survey on the use of the tool. The aim of this study was to investigate if the tool identifies areas for improvement for rehabilitation wars regarding CRE, and whether the methodology of the tool feasible is.

The main findings of this thesis, implications for clinical practice, and future research perspectives are discussed in a broader perspective in the general discussion in **chapter 7**.

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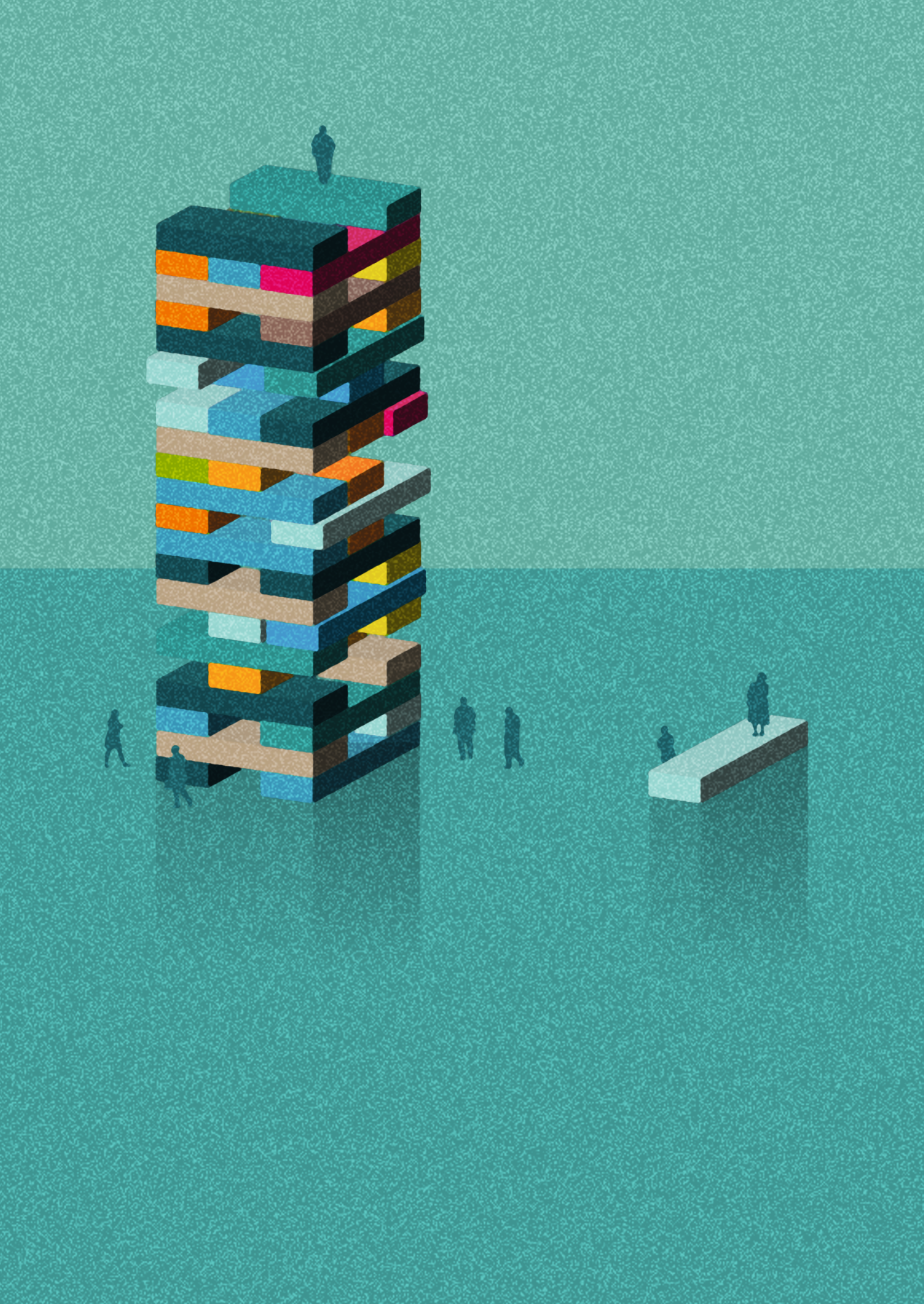

Chapter **2**

Challenging Rehabilitation Environment for older persons

Tijsen LMJ, Derksen EWC, Achterberg WP, Buijck BI.
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Abstract

Introduction: After hospitalization, 11% of older patients are referred for rehabilitation. Nowadays, there is a trend to formalize the rehabilitation process for these patients in a Challenging Rehabilitation Environment (CRE). This concept involves the comprehensive organization of care, support and the environment on a rehabilitation ward. However, since literature on the principles of CRE is scarce, this review aimed to explore and describe the principles of CRE.

Methods: A search was made in PubMed for relevant literature. Then, articles were hand searched for relevant keywords (ie task-oriented training, therapy intensity, patient-led therapy, group training), references were identified, and topics categorized.

Results: After scrutinizing 51 articles, seven main topics were identified: 1) Therapy time; ie the level of (physical) activity; the intensity of therapy and activity is related to rehabilitation outcomes, 2) group training; used to increase practice time and can be used to achieve multiple goals (eg activities of daily living, mobility), 3) patient-regulated exercise; increases the level of self-management and practice time, 4) family participation; may lead to increased practice time and have a positive effect on rehabilitation outcomes, 5) task-oriented training; in addition to therapy, nurses can stimulate rehabilitants to perform meaningful tasks that improve functional outcomes, 6) enriched environment; this challenges rehabilitants to be active in social and physical activities, 7) team dynamics; shared goals during rehabilitation and good communication in a transdisciplinary team improves quality of rehabilitation.

Discussion: This is the first description of CRE based on literature; however, the included studies discussed rehabilitation mainly after stroke and for few other diagnostic groups.

Conclusions: Seven main topics related to CRE were identified that may help patients to improve their rehabilitation outcomes. Further research on the concept and effectivity of CRE is necessary.

Keywords

geriatric rehabilitation, postacute care, care process, aging

Introduction

The global population aged ≥60 years has increased from 382 million in 1980 to 962 million in 2017 and is expected to increase to 2.1 billion by 2050. The population aged ≥80 years is expected to increase more than threefold, from 137 million in 2017 to 425 million in 2050.[1] Currently, high-income countries have the highest prevalence of older people.[2] Together with the aging of the population, there is an increase in multimorbidity and geriatric syndromes (frailty, impaired cognition, continence, gait and balance problems). This leads to a higher risk of disability with impairments in functioning in daily life.[2-4]

Patients with frailty or multimorbidity have a higher risk for hospitalization and adverse outcomes, such as hospitalization-associated disability and the inability to live independently.[5] In older persons, common reasons for hospitalization are cardiac events, infections, fall-related injuries, stroke, cancer, or medical/surgical interventions.[6] Hospitalization-associated disability occurs in at least 30% of patients aged ≥70 years. For frail older persons the rates of hospitalization-associated disabilities are as high as 40% and patients may, therefore, be unable to return home.[5,6]

After hospitalization on an acute geriatric ward, 11% of those aged ≥75 years are referred for rehabilitation to a rehabilitation unit.[7] For individuals with disability, the aim of rehabilitation is to regain and maintain optimal functioning in interaction with the environment.[2,4] Specifically, geriatric rehabilitation is defined as a multidisciplinary set of evaluative, diagnostic, and therapeutic interventions whose purpose is to restore functional ability or enhance residual functional capability in elderly people with disabling impairments.[8] Rehabilitation occurs within a specific period of time and involves identification of a person's problems and needs, which leads to the defining of rehabilitation goals with subsequent interventions offered by a multidisciplinary team. The rehabilitation team consists of therapists and rehabilitation workers, such as occupational therapists, physical therapists, psychologists, social workers, speech and language therapists, dietitians, nurses and general practitioners.[4]

Rehabilitation of geriatric patients has a positive effect on outcomes for functioning, relative risk for nursing home admission, and relative risk for mortality.[9] After rehabilitation in a Skilled Nursing Facility (SNF), on average 73% of the geriatric patients are discharged to their home situation. However, this percentage varies between diagnostic groups, where 63% of patients after stroke are able to go home compared to 81% of patients with a traumatic injury.[10]

Recently, one study investigated implementation of a structured program to increase activity for stroke survivors receiving inpatient rehabilitation.[11] This program is similar to the rehabilitation programs on geriatric rehabilitation wards in SNFs in the Netherlands. In these SNFs the rehabilitation process is formalized in what is called a 'Challenging Rehabilitation Environment' (CRE). However, since there is no official definition of a CRE, there are considerable differences between the wards. CRE involves the comprehensive organization of care and support by the rehabilitation team, as well as the environment in which the rehabilitation takes place.[12] However, because the above-mentioned program did not include the environment or team dynamics of the multidisciplinary team, it seems to be less specific than a CRE.[11]

This narrative review explores the evidence from relevant literature regarding topics related to a CRE with the aim to address the question: What is a challenging rehabilitation environment and which topics can be identified to help model such an environment?

Method

To answer the research question, a narrative review was performed. Therefore, a literature search was made in PubMed using combinations of the following terms: 1) rehabilitation, 2) multidisciplinary, 3) enriched environment, and 4) patient participation. After accepting a publication for inclusion in the present review, the list of keywords was searched for relevant keywords to supplement the literature search for this article; this led to the list of search terms presented in Table 1.

Likewise, the list of references of each included article was hand searched for potential additional relevant articles. Articles were included if they concerned (post) acute rehabilitation (preferably for older persons), the organization of the rehabilitation process, type of therapy, or the level of activity of patients. Possible new keywords were included if they were related to elderly, facilities were rehabilitation takes place, and treatment during rehabilitation.

Based on the content, the main topics on CRE were determined; studies could provide information on multiple topics. The information was summarized in a data table used to categorize the available evidence.

Table 1. Search terms used for the present review

Population and facilities	Type of rehabilitation	Potential topics
Elderly	Stroke rehabilitation	Multidisciplinary
Aged	Recovery of function	Transdisciplinary
Skilled nursing facilities	Rehabilitation	Interdisciplinary
Nursing homes	Geriatric rehabilitation	Task-oriented training
Rehabilitation centers	Slow-stream rehabilitation	Group training
Inpatient	Public health	Patient-regulated exercise
Caregiver	Integrated care	Independent practice
	Post-acute care	Patient-led therapy
		Patient-directed therapy
		Time use
		Therapeutic activities
		Therapy intensity
		Therapy time
		Functional exercise
		Patient participation
		Enriched environment
		Healing environment
		Active rehabilitation climate
		Active rehabilitation culture
		Therapeutic milieu
		Challenging rehabilitation environment

Results

The selection procedure led to the inclusion of 51 articles, mainly from Europe, Australia and the USA. Based on these articles, seven main topics were identified that were considered important for a CRE, ie 1) therapy time, 2) group training, 3) patient-regulated exercise, 4) family participation, 5) task-oriented training, 6) enriched environment, and 7) team dynamics.

These topics are discussed separately below.

Therapy time

Of the 51 articles, 20 reported on how patients spent their day on a rehabilitation ward, describing the amount of therapy given and the effect of increased therapy time on rehabilitation outcomes. Increased therapy time and the level of activity of patients was an important predictor of better rehabilitation outcomes.[13-32]

Current therapy time

The studies showed that patients have a low level of activity during inpatient rehabilitation.[13,14,22,25-29] In Western countries, during inpatient rehabilitation for stroke, patients spent up to 80% of their day on non-therapeutic activities (of which 28-38% spent sitting or lying). Patients spent 49-60% of their day alone and 48% inactive. The amount of time spent on therapeutic activities ranged from 9-56%. Patients with higher functional levels spent more time on therapeutic activities.[13,14,25-29]

Similar results were found for older patients rehabilitating for other conditions within inpatient facilities. For example, patients with orthopaedic problems of the lower extremities who were able to walk independently or with support, walked for an average of only 8 min/day (as measured with an activity monitor). None of them achieved 10 min of moderately intensive physical contiguous activity. Consequently, these patients did not reach the amount of activity that is recommended in guidelines (ie, 30 mins of moderate intensive physical activity, completed in bouts of ≥10 min, on at least 5 days/week).[22]

During inpatient rehabilitation, the professional with whom patients spent the most time was the nurse, ie, up to 13% of the working day (the weekends had even more contact moments than during weekdays). Therefore, the challenge for nurses is to encourage patients to do more task-specific training during their ADL and thereby increase therapy time, especially during times when other professionals are less/not present.[13,14,25,27,30]

Effect of increased therapy time

While patients had low levels of activity and therapy time during inpatient rehabilitation, the therapy time appeared to be related to the outcome of rehabilitation.[13,15-24,31-33]

An increase in therapy time was associated with positive outcomes such as return home, functional recovery, and a shorter length of stay. A decrease of therapy time was associated with return to hospital or death.[18,19,22,23,33] For example, for older patients rehabilitating after hip fracture, 1 h extra therapy led to a 3.1% increased chance of returning home.[24]

For stroke patients, the amount of therapy time proved to be a predictor of rehabilitation outcomes. Among others, effects were reported in mobility, self-care and functional recovery.[15,16,31,32] An increase of time spent on therapy led to better results concerning functional recovery, independence in ADL, instrumental ADL, and walking speed, as well as a shorter length of stay in the inpatient facility and an increased chance of returning home.[17-20]

For recovery after stroke, at least 16 h/week of high-quality therapy is required for older patients.[21] For patients aged ≥65 years, an increase from <3 h to >3-3.5 h of therapy/day led to an improved functional recovery (as visualized with a three-point gain on the functional independence measure) whereas an increase to >3.5 h yielded no significant difference.[15] An increase of (independent) practice can be achieved if nurses incorporate the rehabilitation goals in daily care. Task-oriented activities must be an important part of daily reality. Through encouragement by nurses and family, the time spent on therapeutic activities can be increased by 50 min/day.[13,21]

In conclusion, for all patients, the amount of time spent on therapy was related to rehabilitation outcome. However, there tended to be a ceiling effect in the influence of therapy time, while the level of physical activity during inpatient rehabilitation was low. Encouraging patient-regulated exercise and task-specific training during ADL by nurses and family increased therapy time.

Group training

During rehabilitation, group training is often used by different therapists (eg speech and language therapists, occupational therapists, psychologists and physical therapists), among other things, to enable increased practice time without increasing staffing.[34-36]

Regarding circuit class therapy, physical therapy is provided in groups and focus on repetitive practice of functional and meaningful tasks. This may comprise either a series of workstations arranged in a circuit, or a series of individualized activities in a group setting.[34] Compared to individual therapy sessions, in circuit class therapy sessions patients with stroke spent more time in active task practice and a similar amount of time in walking practice.[37] For patients after stroke, circuit class therapy was effective in improving mobility. Patients were able to walk further, faster, less dependently, and were more confident in their balance. Although there seemed to be no greater risk of falls, this item needs further research.[34]

During inpatient rehabilitation after stroke, group training provided by occupational therapists was feasible for task-specific practice, such as dressing tasks. After receiving group training, a clinically significant improvement in dressing performance was found, although no comparison was made with individual therapy. Nevertheless, this study demonstrated that group therapy is feasible, even for personal ADL.[38]

Likewise, for persons rehabilitating after a knee or hip replacement, group training proved to be as effective as individual rehabilitation. Patients who received group training had no different clinical/disability evaluation and level of quality of life compared with patients receiving individual therapy.[39]

Patient-regulated exercise

Apart from the therapy sessions, patient-regulated exercise is a way to increase the amount of therapy time without increasing staff levels. Among other things, it can be used for motor goals and for goals related to aphasia. Patients rehabilitating after stroke were positive about this form of therapy; they found it useful, enjoyed it, would recommend it to other patients, and considered it an acceptable complement to face-to-face therapy.[40,41] Patients appeared to practice less than recommended (ie 5-15 min per session for 7 days, whereas 30 min per session during 28 days was recommended). Therefore, it is important to ensure that the exercises are challenging, fit the level of the patient, and are tailored to personal interests.[41,42]

Limited research was found regarding patient-regulated exercise for inpatient rehabilitation. A small study in 2002 reported no benefits after four weeks independent practice of motor tasks. In this latter study, only 5 patients in the intervention group were tested after the intervention; moreover, these patients missed 20% of the intervention.[43] Later studies showed some improvement in strength, dexterity, word-finding and confidence in talking; however, due to small study populations and different research goals, no significant results could be extrapolated.[41,42]

In patients rehabilitating after stroke, an increase in autonomy was related to regained abilities and self-confidence. Autonomy can be enhanced by minimizing care routines and by providing room for performing activities independently and privately. Attention to patients' autonomy improved patients' active participation in rehabilitation, quality of life, and independent living after discharge.[44] In stroke patients, self-regulation appeared useful and feasible for improving task performance that demands both motor and cognitive abilities, by promoting information processing and active learning.[45]

Family participation

For patients rehabilitating after stroke, prior living conditions (ie, living alone vs not living alone) were predictive for discharge destination. The availability of a caregiver at home was important for discharge to the community after stroke rehabilitation. Therefore, it is important for the caregiver to participate in the

rehabilitation process, which helps prepare them for when the spouse/relative returns home.[46]

Additional practice with caregivers led to an increased amount of time spent in exercise which, in turn, led to an improvement in body function, more activities, and better participation after stroke.[47-50] Caregiver support accounted for 5-9% of upper-limb improvement by increasing the amount of time spent in exercise.[49] The increased involvement of the caregiver reduced the levels of caregiver burden and facilitated transition to the home setting, with patients becoming more integrated into their community.[50]

One study compared the effects of voluntary training with family members to voluntary training with a physical therapist. Both groups received standard care and the amount of voluntary training was the same. Although there was no significant difference in functional recovery, the family participation group had a significantly shorter length of stay and higher rates of discharge home.[51]

Training of caregivers on common stroke-related problems, and training in lifting and handling techniques, led to decreased costs of care in the year after rehabilitation. Furthermore, after this training, the reported caregiver burden was lower. Both patients and caregivers had less anxiety and depression, and better quality of life.[52]

Task-oriented training

Task-oriented training involves the active practice of task-specific motor activities and is a component of current therapy approaches in stroke rehabilitation. A circuit class format is a practical and effective way to provide supervised task-oriented training. Multiple trials and reviews on task-oriented training after stroke showed benefits for functional outcome compared with traditional therapies. These benefits were seen in both upper/lower limb functions and activities (eg, arm/hand function, lower limb function, walking distance, gait speed, and functional ambulation). Task-oriented training led to improvements in functional outcomes and overall health-related quality of life.[38,53-56]

Nurses played a significant role in task-oriented training. They could create opportunities to practice meaningful functional tasks outside of regular therapy sessions. Many interventions could be part of task-oriented training during and outside regular therapy sessions, such as walking (on the ground or on a treadmill), cycling program, endurance training, circuit training, sit-to-stand exercises, and reaching tasks to improve balance. The training needed to be repetitive, task-specific and meaningful for the patient.[53]

A review operationalized 15 components of task-oriented training: 1) functional, 2) directed toward a clear functional or everyday life activity (ADL) goal, 3) patient centered, 4) repeated frequently (overlearning and overload principle), 5) used with real-life object manipulation, 6) performed in a context-specific environment, 7) performed in increasing difficulty levels (exercise progression), 8) varied (within one task), 9) followed by feedback on the exercise performance, 10) exercised in multiple movement planes, 11) included total skill performance, 12) patient customized for training load, 13) offered in random practice, 14) occurred through distributed practice, and 15) composed of bimanual tasks. Not all components were used during a task-oriented training and the number of components used in an intervention after stroke was not associated with the size of the posttreatment effect. The components 2, 9, 13 and 14 were associated with the largest effect sizes. Although no studies have compared the importance of these components for training outcomes, they seemed to be important components of a task-oriented training program.[57]

Enriched environment

Patients rehabilitating after stroke reported a lack of opportunities to drive one's own recovery outside of therapy time. This was confirmed by clinical staff, who perceived a lack of places to go to, and a passive rehabilitation culture and environment. Therefore, there was a need to increase opportunities for practice and promote active engagement. Creating an enriched environment can be a good solution.[5858] An enriched environment can be achieved in both communal and individual areas. Opportunities for enrichment include the provision of music, audio books, regular books and other reading materials, puzzles, games, hobby supplies, tablets and a computer with internet connection. Other possibilities are

the availability of recreational activities (eg bingo), as well as communal areas for eating, socializing and daily group activities.[59,60]

Until recently, an enriched environment remained largely a laboratory phenomenon with little translation to the clinical setting. In animals, an enriched environment proved to be a robust intervention for fostering brain plasticity and recovery from various types of brain injury, including stroke.[61] This latter research showed that the ideal enriched environment encourages socialization, exercise, sensory and cognitive stimulation, and task-specific exercise. Reasons for the lack of studies in a clinical setting include difficulties in standardizing enriched environmental conditions across clinical sites, a lack of knowledge concerning what aspect of enrichment represents critical or active ingredients for enhancing brain plasticity, and the actual required 'dose' of enrichment is unknown.[61]

A few recent studies on an enriched environment were performed in a clinical setting. One study in a post-acute mixed rehabilitation unit showed that patients in an enriched environment were more likely to be engaged in cognitive, physical and social activities and less likely to be inactive, alone or asleep compared to patients not in an enriched environment.[59] Another study in an acute stroke unit of an Australian hospital showed similar results. The patients rehabilitating in an enriched environment were 71% of the day engaged in any activity vs 58% of the control group. In the physical domain this was 33% vs 22%, the social domain 40% vs 29%, and in the cognitive domain 59% vs 45%. Patients in the enriched environment had a significantly shorter length of stay.[60]

Team dynamics

A rehabilitation team (usually) consists of a physician, nurses and therapists such as occupational therapists, physical therapists, psychologists, social workers and speech and language therapists.[4] Rehabilitation is a team effort and the way teams are organized affects the results of rehabilitation. Most of the rehabilitation teams evolved over time from intradisciplinary teams through multidisciplinary and interdisciplinary teams to transdisciplinary teams, resulting in more intensive collaboration.[62-64]

In all these team models the aim is rehabilitation of the patient, whereas the focus of the professionals often differs. In intradisciplinary teams the focus is usually on function level; with the transition towards multidisciplinary teams this focus shifted to a combination of function and activity level. With interdisciplinary teams, this was shifted more towards ADL activities and, to a certain extent, towards participation level.[62,63]

In these four types of team models, a major difference is the level of working on shared goals and the communication between team members. Whereas in intradisciplinary teams there are no shared goals and little communication between professionals, this develops through multidisciplinary and interdisciplinary teams towards very good communication in transdisciplinary teams. In this latter model, professionals cross the border into another team member's professionalism and each team member is responsible for each goal. A shared conceptual framework is used, where discipline-specific theories, concepts and approaches are combined.[62,63]

An interdisciplinary team and a transdisciplinary team model are similar. One difference is that, in a transdisciplinary team, the patient is also seen as a team member. Also, in a transdisciplinary team, the responsibility of all team members for all goals is more firmly stated, compared to an interdisciplinary team.[62,63]

Not all types of team models have been included in studies on the influence of team models on rehabilitation. The common result in these studies was the importance of shared goals throughout rehabilitation and good communication within the rehabilitation team.[62,63] However, the recommended level of integration between the professionalism of the different team members were not consistent in the various studies. This resulted in a disagreement between the recommendation for a multidisciplinary team model or a transdisciplinary team model.[62,63]

Taking into account the role of the patient in a transdisciplinary team model and the responsibility of all team members for all goals in this model, preference is given to a transdisciplinary team model.

Discussion

Until now, no scientific vision is available regarding a CRE. This review provides, for the first time, a description of a CRE and the topics that can be identified for modelling a CRE. After examining the relevant literature, seven main topics were identified: 1) therapy time, 2) group training, 3) patient-regulated exercise, 4) family participation, 5) task-oriented training, 6) enriched environment, and 7) team dynamics.

All studies included in this review, regarding therapy time during inpatient rehabilitation, agreed on a low level of activity of patients. Differences in the precise level of activity could be explained by the way in which the activities were perceived or were concluded to be therapeutic, ie, eating/drinking, transport/traveling, ADL, and communication. Other possible explanations were differences in the amount of group therapy, patient-regulated exercise, and family participation. Furthermore, the studies agreed on the importance of activity and increased therapy time for better rehabilitation outcomes for all diagnostic groups.[13-32] The challenge is to increase therapy time; however, in most countries, no increase in revenue or numbers of staff can be expected. Some studies presented ideas to meet this challenge, eg group therapy, independent practice, family participation and task-specific training during ADL.[13,14,25-30] Since these factors are important in a rehabilitation program, they are also important topics for modeling CRE.

Group therapy can be used for multiple goals in multiple diagnostic groups and is an effective way to increase therapy time without increasing staff levels. Although not all studies compared group therapy and individual therapy, all reported a positive effect of group therapy on rehabilitation goals. Studies comparing these two forms of therapy reported at least an equal effect of group therapy compared to individual therapy.[34-39] Therefore, group therapy is an effective way to increase therapy activity and can be used during rehabilitation to work on patient goals. It may enhance rehabilitation outcomes and have a beneficial effect on the length of stay in a rehabilitation facility. Staff needs to be encouraged to let group therapy be part of their treatment options.

During inpatient rehabilitation, patient-regulated exercise is another effective way to increase therapy time without increasing staff levels. Patients were positive about this form of therapy, although treatment fidelity remains a challenge. Increasing autonomy is important to regain self-confidence and improve patients' active participation in rehabilitation.[40-42,44] One included study contradicted the others regarding the effectivity of patient-regulated exercise, by showing no significant benefits after four weeks of patient-regulated exercise; however, this study had a very small population with a high dropout.[43] Moreover, since two later studies showed positive effects of patient-regulated exercise, it seems to be an important part of rehabilitation and suitable to increase therapy time. When patient-regulated exercise is recommended, the exercises need to be stimulating and appropriate for the patient's individual level. Also, evaluation and feedback will help to increase the therapy fidelity of patient-regulated exercise.

Studies reported the importance of caregivers in the rehabilitation process; moreover, the availability of caregivers is an important predictor for discharge home. Additional practice with caregivers leads to increased exercise time, leading to improved body function, activities and participation, better quality of life for both patient and caregiver, shorter length of stay, and reduced levels of caregiver burden.[46-52] Caregivers should be trained and involved in therapies, not only to increase therapy time, but also to increase knowledge of common (stroke-related) problems and their prevention, and to acquire lifting/handling techniques tailored to the needs of the individual patient. Rehabilitation wards need to stimulate caregivers to be part of the rehabilitation process and to teach caregivers about the health problems of their loved ones.

Multiple trials and reviews have investigated task-oriented training after stroke and all reported benefits for functional outcomes compared with traditional therapies. Task-oriented training has proven effective for improving body functions and activities, and quality of life.[38,53-56] Task-oriented training is already part of the current therapy approach during stroke rehabilitation. It is important to involve nurses in task-oriented training; they can create opportunities to practice meaningful functional tasks outside regular therapy sessions.

There is (laboratory) evidence that an enriched environment is effective for the rehabilitation of animals with brain injury.[61] This effect was also shown in two studies in a clinical setting; patients tended to be more active in the cognitive, physical and social domains in an enriched environment.[59,60] There is still a lack of knowledge concerning what aspects of enrichment represent the critical or active ingredients for enhancing brain plasticity, and the required 'dose' of enrichment is unknown. More research is needed on these components of an enriched environment; meanwhile, however, an enriched environment seems to be an effective addition to the rehabilitation program. For creating an enriched environment, it is important to have a communal area. Furthermore, the stimulation of social interaction and the provision of material for activities is important in an enriched environment.

Studies show that rehabilitation is a team effort involving multiple disciplines. Whereas in the past rehabilitation was an intradisciplinary team effort, this has evolved into interdisciplinary or transdisciplinary teams. In both interdisciplinary and transdisciplinary teams, communication and working on shared goals is important. In a transdisciplinary team the patient is seen as a team member; moreover, the responsibility of all team members for all goals is more firmly stated than in an interdisciplinary team; this results in more integration between the professionals of a transdisciplinary team.[62-64] Although all studies mentioned the importance of shared goals and good communication in a rehabilitation team, not all studies included all types of team models in their research. Taking into account the role of the patient in a transdisciplinary team model and the responsibility of all team members for all rehabilitation goals, preference is given to this model; particularly when considering that patients themselves generally know best which goals they have to achieve to be able to go home. The challenge for most rehabilitation teams is to make the patient and their caregiver an equal member of the team, and for all team members to feel responsible for all rehabilitation goals.

This review is the first to provide details on a CRE based on an extensive literature search and, therefore, provides the first evidence-based description of a CRE. Evidence was found that all the identified topics apply to different diagnostic groups. However, the studies on the topics mainly focused on evidence related to rehabilitation after stroke, despite the presence of more diagnostic groups in

which older patients need rehabilitation after hospitalization. This is a limitation in this review. Although a CRE seems to be in place for all older patients, more studies are required on the above-mentioned topics for all diagnostic groups.[6,10,12] The authors expect that all these topics may prove to be an important factor for all older patients during their rehabilitation.

Based on this review, seven main topics were identified for modelling a CRE. It is important to investigate whether these topics are supported by experts, healthcare workers and patients in the field of rehabilitation, and to demonstrate the effectivity/efficiency of a CRE in prospective studies. Finally, although the use of technology shows promise for improving activity levels, no body of evidence is yet available to substantiate this.[65] Therefore, more research on this topic is also required.

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Disclosure

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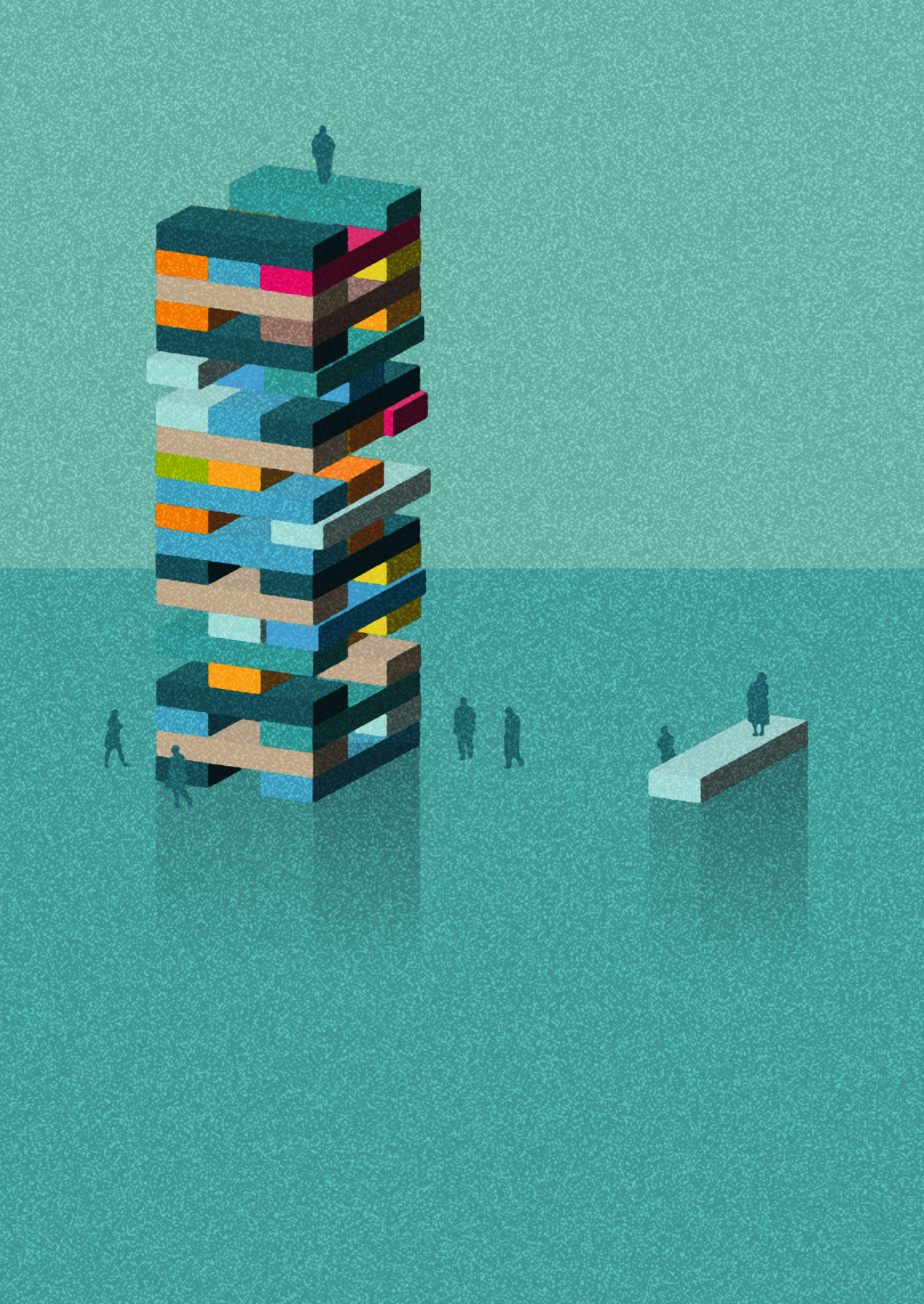

Chapter 3

A qualitative study exploring rehabilitant and informal caregiver perspectives of a Challenging Rehabilitation Environment for geriatric rehabilitation

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Abstract

There is a trend towards formalization of the rehabilitation process for older rehabilitants in a Challenging Rehabilitation Environment (CRE). This concept involves the comprehensive organization of care, support, and environment on rehabilitation wards. So far, literature about the principles of CRE is scarce. This study aims to explore the opinions of rehabilitants and informal caregivers regarding CRE, through a qualitative study between 2019 and 2020.

Three telephone interviews were conducted with informal caregivers, and also three focus groups with 15 rehabilitants and three informal caregivers, all with recent experience in rehabilitation. Nine themes emerged regarding the rehabilitation process: 1) rehabilitant (attention for resilience, motivation, cognitive and emotional aspects), 2) rehabilitant centered (goal setting, physical and cognitive functioning and coping), 3) informal caregivers (involving and attention for resilience and relation), 4) communication (aligning the rehabilitation process), 5) exercise (increasing intensity by using task-oriented exercise, patient-regulated exercise and group training), 6) peer support (learning experiences and recognition), 7) daily schedule (influence on the planning and activities outside therapy), 8) nutrition (energy for rehabilitation), and 9) eHealth (makes rehabilitation more challenging and fun). Regarding organizational processes four themes were identified: 1) environmental aspects (single bedrooms, shared room for activities and therapy options on the ward), 2) staff aspects (small team with an emphatic supportive and motivating attitude), 3) organizational aspects (organized in an efficient way), and 4) return home (the discharge process should be well prepared for instance with home visits).

Organizing excellent rehabilitation care requires a thorough understanding of the concept of CRE, as it is a complex and comprehensive concept that concerns the whole rehabilitation process. Its effectiveness and efficiency should be researched in prospective studies.

Key words

Challenging rehabilitation environment, geriatric rehabilitation, informal caregiver, rehabilitant

Introduction

The demand for Geriatric Rehabilitation (GR) in Europe increases with the ageing of the population.[1] After hospitalization, 11% of those aged ≥ 75 years are referred to a post-acute geriatric rehabilitation unit.[2] Common reasons for hospitalization of older persons are cardiac events, infections, fall-related injuries, stroke, cancer, or medical/surgical interventions.[3] In 2019, 53.320 rehabilitants in the Netherlands were referred for GR.[4]

GR is defined as 'a multidimensional approach of diagnostic and therapeutic interventions, the purpose of which is to optimize functional capacity, promote activity and preserve functional reserve and social participation in older people with disabling impairments'.[5]

Persons who are rehabilitating are trying to adapt and self-manage their current condition. In line with the ideas on positive health of Huber et al., we have chosen not to label persons during their rehabilitation as patients, but to use the term "rehabilitants" when referring to them.[6]

A Challenging Rehabilitation Environment (CRE) is a relatively new concept which involves the comprehensive organization of care and support by the rehabilitation team, as well as the environment in which the rehabilitation takes place.[7,8] Knowledge about this concept may improve the rehabilitation outcomes of rehabilitants, e.g. in terms of functional recovery, length of stay, (health-related) quality of life and lower caregiver burden.[8]

In a review, seven main components for modelling CRE were identified: 1) therapy time, 2) group training, 3) patient-regulated exercise, 4) family participation, 5) task-oriented training, 6) enriched environment, and 7) team dynamics.[8]

Because there is no official definition of CRE, there are considerable differences between wards in the interpretation and execution of CRE. Therefore, it is not certain that the beforementioned components cover all aspects of CRE. In addition, it is unknown which components rehabilitants and their informal caregivers consider relevant for a CRE. The aim of rehabilitation is to optimize the level of

functioning of a rehabilitant. The availability of an informal caregiver during and after the rehabilitation is beneficial for the rehabilitation outcomes.[8] Therefore, it is essential to know their vision about an optimal rehabilitation environment.

The aim of the CREATE study (Challenging REhAbiliTation Environment) is to substantiate the added value of the concept of CRE.[9] In this study we therefore explore the perspectives of rehabilitants and their informal caregivers regarding components that are relevant for modelling and understanding the principles of a CRE. By integrating the evidence found in the literature and the perspectives of rehabilitants, informal caregivers and professionals, an evidence-based conceptualization of CRE can be developed.

Methods

Study design

A qualitative study, consisting of focus groups and telephone interviews, was performed between September 2019 and October 2020. The aim of this research was to explore the perspectives of (older) rehabilitants and informal caregivers on the concept of CRE. Qualitative research attains to gain a better understanding of a phenomenon through the experiences of those involved.[10]

We adhered to the consolidated criteria for reporting qualitative research (COREQ) for improving the quality of reporting qualitative research (see Supplemental Table).[11]

Recruitment of participants

Organizations affiliated with the six scientific networks (living labs) for elderly care in the Netherlands demonstrate interest in scientific research. Therefore, these organizations were approached by email with information about this study.[12] They were requested to inform rehabilitants and their informal caregivers about the study, and to ask them to individually participate. In addition, members of a patient association for patients with acquired brain injury 'Hersenletsel', were asked to participate.[13] We aimed at a mix of participants with different diagnoses and ages.

Rehabilitants and informal caregivers were included if they were currently participating or had recently participated in a (geriatric) rehabilitation process. Rehabilitants and informal caregivers were excluded if they were diagnosed with dementia, were (legally) unable to give informed consent, or were not proficient in the Dutch language.

If rehabilitants and/or their caregivers were interested in the study, they received an information leaflet. If they remained interested or had additional questions, they were put in contact with the primary researcher (LT). Questions were answered, and the informed consent form was signed by the participant and LT. If an informal caregiver participated without the rehabilitant, the rehabilitant was asked for permission to interview the informal caregiver. An appointment was then made for a focus group or telephone interview.

We aimed for data saturation, and after each focus group or interview, the authors discussed whether any new topics had emerged. Inclusion stopped when no new topics emerged.

Data collection

In preparation for the data collection, a topic list was established based on the above-mentioned review (appendix 1).[8] This topic list was piloted with a group of researchers. The content of the list was determined in an iterative process, and adapted based on the pilot and previous focus groups or interviews.

The focus group interviews were chaired by BB and LT. Female nursing senior researcher in the field of rehabilitation BB has experience in qualitative research and chairing discussion groups. Physical therapist LT is a female PhD student with formal training in interview techniques and qualitative research and 10 years' experience in geriatric rehabilitation.

The focus groups were held on rehabilitation wards in various regions in the Netherlands. All focus groups were performed in meeting rooms and only the participants and researchers were present.

Due to COVID-19, we switched from focus group meetings to individual, semi-structured, telephone interviews with informal caregivers during the data collection. These interviews were conducted by LT, using the same topic list.

Each focus group and telephone interview began with a brief introduction by the researchers on the topic of the focus group, followed by an introduction of the participants. The participants were then asked to share their perspectives on CRE. The chair used open ended questions based on the topic list and further explored the answers that were given. To increase the internal validity, participants were also asked to share their perspectives on subjects not mentioned in the topic list, but which they considered important regarding CRE. During each focus group and interview, LT made field notes.

On average the focus groups lasted 90 minutes and the telephone interviews 45 minutes. Both were audio recorded and transcribed verbatim by LT. Transcripts were not returned to participants, but at the end of every interview the chair verified a verbal summary with the participants.

Data analysis

Simultaneous with the data collection, thematic analysis was performed to identify, analyze, and report patterns in the data.[10,14] ATLAS.ti version 7.5 was used for coding the data in the analyzing process.

LT read and re-read the data to become familiar with the data, after which initial themes were identified while reading through the transcript using an open-coding approach. These initial themes were checked by BB and ED to determine inter-rater comparison. ED is a female nursing senior researcher with experience in qualitative research.

Differences in the coding were discussed by LT, ED, and BB, until an agreement was reached. Each initial theme was described in a memo.

The identified initial themes were combined into main themes with associated sub-themes. The connections and contradictions between the initial themes

were described per main theme, and connections between main themes were described.

Each main theme was assessed for data saturation, after which the research team discussed the contents of the main themes. After agreement was reached in the research team, each main theme was meticulously described, and relevant quotes were identified and translated from Dutch into English.

Results

Participants

The approached rehabilitants (15) and informal caregivers (6) all agreed to participate. In September and October 2019, a total of three focus group interviews were conducted and in September and October 2020, three telephone interviews were held with informal caregivers. Rehabilitants were between 43 and 90 years old and informal caregivers between 49 and 77 years old. Rehabilitation diagnoses were lower limb amputation, trauma, hip fracture, COPD and acquired brain injury, including stroke. Characteristics of the participants are shown in table 1.

Table 1. Characteristics of participants

		Rehabilitants (n=15)	**Informal caregivers (n=6)**
Age	Range (median)	43-90 (75)	49-77 (72)
Gender	Male	9	2
	Female	6	4
Diagnosis	Lower limb amputation	2	
	Trauma, excl. hip fracture	5	1
	Hip fracture	1	
	COPD	1	
	Acquired brain injury, incl. stroke	6	5
Relationship	Spouse		5
	Daughter		1

Themes

Thirteen main themes with associated sub-themes emerged from the data. The main themes can be divided into two categories, namely themes involving the rehabilitation process and themes involving organizational processes. The sub-division of the themes in the two categories is described in tables 2 and 3. The two categories are described in the following paragraphs.

Table 2. Themes involving rehabilitation process

Main theme	Brief description	Sub-theme	Description
Rehabilitant	CRE is suitable for all diagnoses groups. Attention must be given to resilience, motivation and cognitive and emotional aspects of rehabilitants.	Resilience	The resilience of rehabilitants can vary and may differ from pre-diagnosis. Rehabilitants would like guidance on how to deal with this, as they often tend to go beyond their limits.
		Motivation	Participants think being motivated for rehabilitation is important. Motivation differs per rehabilitant. Working on the individual rehabilitation goals, strong involvement of professionals and the use of technologies can be motivating.
		Cognitive and emotional aspects	Rehabilitants feel frustrated when dependent on professionals and informal caregivers. Especially in case of neurological diagnoses, rehabilitants do not always feel others empathize with what they are going through. They would like more consideration for and better explanation of their problems, for themselves and also for their caregivers. These problems include, for example, altered stimulus processing, overburden, decline of executive functions, dealing with emotions, loss of memory and loss of initiative.
		Diagnosis	CRE is suitable for all diagnoses. Although rehabilitants appreciate having rehabilitants with similar diagnoses on the ward, they do not consider complete differentiation based on diagnosis necessary.

Table 2. Themes involving rehabilitation process *(continued)*

Main theme	Brief description	Sub-theme	Description
Rehabilitant-centered process	The rehabilitation process should be tailored to a rehabilitants situation. This includes the goal setting process, the level of physical and cognitive functioning and coping with the life event for which they are rehabilitating.	Goal setting	Rehabilitation goals must fit seamlessly with the rehabilitants' situation. Although rehabilitants think that working on their individual goals is motivating, they do not always feel involved in the goal setting process. Some rehabilitants may not be able to set individual goals at the start of their rehabilitation and most of them value the opinion of the professionals. Participants agree that some goals are better achieved at home, not during inpatient rehabilitation.
		Tailor-made rehabilitation	Rehabilitation must be tailored to the rehabilitant's abilities. This tailoring depends on several factors, which sometimes also existed before rehabilitation, e.g. level of physical and cognitive functioning. Rehabilitants with the ability to manage the intensity and planning of the rehabilitation valued this positively.
		Coping with life event	The coping process, which can be compared to a grieving process, can influence the goal setting, and continues after discharge. Rehabilitants and their caregivers must regain confidence in themselves. Contact with fellow rehabilitants and guidance by professionals, e.g. a psychologist, can help with coping.

Table 2. Themes involving rehabilitation process *(continued)*

Main theme	Brief description	Sub-theme	Description
Informal caregivers	Informal caregivers should be involved in the rehabilitation process with attention to their resilience and the relation between the rehabilitant and informal caregiver.	Informal caregiver participation	Informal caregiver participation can have a beneficial effect because caregivers learn what to do at home. But it can also be inhibiting if the caregiver does not trust the rehabilitant. Attention to the resilience of the caregiver is important, and they must be continuously involved in the rehabilitation process. Informal caregivers value doing extra exercises with the rehabilitant and, if needed, are part of the conversation regarding the rehabilitation process.
		Dynamic between rehabilitant and informal caregiver	The role of the caregiver during rehabilitation can depend on the relationship with the rehabilitant. A partner may have a more natural role than another informal caregiver, such as a child. Caregivers consider it quite normal to do extra things for their spouse. However, it is important that the relationship does not become a care-relationship only.
Communication	Communication is important for aligning the rehabilitation process between all involved in the process.		Adequate communication is important for building a treatment relationship, providing mutually relevant information about the disease, aligning goals, communicating exercise options, preparation of the discharge process and the coping process. Participants value reading the reports and the goals in the patient files. Special attention is needed if the rehabilitant cannot oversee his rehabilitation process, for instance due to cognitive impairment, or if the caregiver is unable to come to the ward due to circumstances like COVID-19. Repeating the information is an important aspect.

Table 2. Themes involving rehabilitation process *(continued)*

Main theme	Brief description	Sub-theme	Description
Exercise	Exercise intensity in a CRE should be as high as possible. This can be achieved by integrating task-oriented exercises, patient-regulated exercises and group training into the daily structure.	Therapeutic activity	Although the therapeutic activity varies, most participants indicate they would like to see a higher therapy intensity, with guidance to help avoid overburden. Participants see a role for informal caregivers and nurses to stimulate extra therapeutic activity.
		Group training	Rehabilitants who had experienced it are very positive about group training and find it motivating and helpful to learn from each other. Those without experience in group training cannot imagine how it can be tailored to a rehabilitant's individual goals and situation. They expect it to be less intensive than individual training.
		Task-oriented exercise	Rehabilitants think doing task-oriented exercises, matching their goals and level of functioning, is important. Nurses can be supportive in task-oriented exercises. Rehabilitants want to be independent and need professionals to guide them in safe independent practice training during their daily routine.
		Patient-regulated exercise	Rehabilitants do think patient-regulated exercise is important to increase the therapy intensity, but they need guidance. Exercises need to fit rehabilitant needs, and follow up by professionals is desired. Rehabilitants have concerns regarding overburden, practicing at insufficient intensity, and safety when training individually in therapy rooms without supervision.
Peer support	Peer support is important for learning experiences, putting things in perspective and recognition.		Most rehabilitants think peer support is important for support, putting things in perspective, and recognition. They feel that they are not alone with these problems. Rehabilitants can learn from each other and practicing together can be motivating. Rehabilitants can have a positive or negative effect on the group dynamic.

Table 2. Themes involving rehabilitation process *(continued)*

Main theme	Brief description	Sub-theme	Description
Daily schedule	Rehabilitants want to have input in the therapy planning and would value activities outside therapy moments.	Planning	Rehabilitants prefer a therapy planning in which they have input, such as in terms of intensity, therapy moments should be spread throughout the day. This planning can help them to plan visits and avoid distraction during therapy moments.
		Activities during the day	Besides the therapy moments, participants experience a limited number of activities, which does not stimulate a sense of active rehabilitation. As rehabilitants are not always able to start an activity themselves, they would value (therapeutic) activities outside therapy moments. They also have a need to continue social activities as usual.
Nutrition	Nutrition gives energy for the rehabilitation process, and mealtimes can stimulate contact between rehabilitants.		Good and tasty nutrition is one of the first aspects participants mention as being important during rehabilitation. Nutrition gives energy for the rehabilitation process. If compatible with their goal, rehabilitants think that mealtimes can play a role in task-oriented training. A pleasant mealtime with interaction stimulates contact between rehabilitants and makes rehabilitants feel less lonely.
eHealth	eHealth can make rehabilitation more fun and challenging.		Participants' opinions on eHealth differ regarding their use of it. They may not be using it yet but expect that it will be important for future generations. The use of eHealth must suit the person. eHealth can make the rehabilitation process more fun and can stimulate exercise. It offers communication options in case of aphasia and when used properly, technologies can increase safety, for example in the home situation.

Table 3. Themes involving organizational processes

Main theme	Brief description	Sub-theme	Description
Environmental aspects	A rehabilitation ward should have single bedrooms, a shared room for activities, the possibility to go outside, and therapy options on the ward.	Location of rehabilitation	Rehabilitation should take place close to their own home, in a central location that is easy for people to visit, and also offers other activities so rehabilitants can go shopping. They would rather not rehabilitate in a nursing home with permanent residents, which confronts them with suffering.
		Building aspects	Rehabilitation should take place in small wards with a shared room for activities and mealtimes, and the possibility to go outside. Most participants would like to see therapy options on the ward. The therapy room must have sufficient space, good climate control, and must be easy to adjust based on their needs. Chairs should be provided in long corridors. Rehabilitants with acquired brain injury want attention for low-stimulus areas to avoid overstimulation.
		Bedrooms	All participants want a single bedroom, with a private bathroom. They see benefits to having privacy in the areas of exercise options, night rest, privacy, hygiene and for coping with everything that is happening.
		Tools	On a rehabilitation ward there must be sufficient and practical aids, like exercise material, walking aids, lifting aids and eating and drinking aids. Bicycles, a walking circuit, relevant games, tablet with aphasia programs and walking rails are named as examples of desired exercise materials.

Table 3. Themes involving organizational processes *(continued)*

Main theme	Brief description	Sub-theme	Description
Staff aspects	The rehabilitation facility should have small teams with good mutual communication. All team members should have a empathic way of supporting and motivating rehabilitants.	Staff	Staff must guide rehabilitants in their rehabilitation process in an empathic way, both in terms of emotional support and in exercising. They need knowledge, provide information, have an active attitude, communicate well and stimulate or, if necessary, slow rehabilitants down. A good relationship with staff can have a stimulating effect on the rehabilitant.
		Team	Participants prefer small teams with good mutual communication. Team members need to be aware of rehabilitation (needs) and strive for sufficient collaboration with other team members. Mentioned team members are: physical therapist, occupational therapist, psychologist, nurse, physician, speech therapist, dietician, social work and recreational therapist. Physical therapy is named as the most important discipline; some participants feel resistance to the psychologist. Participants do see a therapeutic role for nurses in practicing activities of daily living, providing support and stimulating additional exercises.
Organizational aspects	Rehabilitation should be organized in an efficient way to optimize the results.		Participants feel that financial cutbacks lead to a high workload for staff and a shorter length of stay, which has adverse consequences for their rehabilitation. They do feel it is important to organize the rehabilitation process in an efficient way, to optimize the results of the rehabilitation.

Table 3. Themes involving organizational processes *(continued)*

Main theme	Brief description	Sub-theme	Description
Return home	The discharge process must be well prepared and supervised. Home visits allow rehabilitants to practice meaningful tasks in their own environment in preparation for their discharge.	Home visit	Home visits during the rehabilitation process are effective to see whether it is possible to function at home and which home adjustments are needed. However, confrontation with (un)expected disabilities can make a home visit emotionally challenging.
		Discharge process	Although some participants think the rehabilitation process is going too fast, most want to keep their time on the ward as short as possible. Good and timely communication about this process is important.
		Collaboration with external care professionals	It is important for transfers between the different settings in a rehabilitation process to take place in a good and timely manner. Participants who have experienced a gap in this process feel they have deteriorated because of it. Participants need advice from (community) therapists with sufficient experience to continue the rehabilitation after discharge.
		Outpatient rehabilitation	Rehabilitants are not sure if their rehabilitation would be faster at home or on a rehabilitation ward. They are all aware that the rehabilitation process continues after discharge. Therapy intensity at home can depend on the funding of health care insurers.

Category 1: Themes involving rehabilitation process

This category consists of nine main themes, namely 1) rehabilitant, 2) rehabilitant centered, 3) informal caregivers, 4) communication, 5) exercise, 6) peer support, 7) daily schedule, 8) nutrition, and 9) eHealth.

Theme 1.1: Rehabilitant

Rehabilitants must learn to deal with changing resilience. Participants agree that some rehabilitants have to be motivated for rehabilitation, while others need slowing down. As one rehabilitant with acquired brain injury said,

> *Because of course there are two extremes. For some things you have to be pulled out of bed, because you don't want to get out of bed, but you have to anyway. And other people start sprinting very quickly, while in fact well… maybe you shouldn't.*

Participants experience feelings of dependency and changes in cognitive and emotional aspects. According to a rehabilitant with a stroke it is important to provide explanations about these changes to both the rehabilitant and his informal caregivers,

> *But even with people who are very close, who really know what is going on etc. Well, I still run into things. Then I think yes… even they don't quite get this.*

Rehabilitants value having peers with similar diagnoses on a rehabilitation ward. But, as one rehabilitant with acquired brain injury said, complete differentiation on diagnoses is not necessary,

> *I do agree with you that you really want to be in a like-minded group. But I want to decide for myself where to sit.*

Theme 1.2: Rehabilitant-centered process

The rehabilitation process must be tailored to the individual goals, abilities, and situation. Working on individual goals can be motivating, but not all rehabilitants are able to set their goals at the beginning of the process, as one rehabilitant with acquired brain injury said,

But in the beginning, it is so important that you have some kind of clarity, of where you want to go. And that those goals are adjusted every time. In the beginning well… when you start something, you have no idea what that is.

This can be influenced by a grieving process, through which a rehabilitant and his informal caregivers need to cope with this life event. In the words of a rehabilitant with a traumatic arm fracture,

I had that last Saturday. I broke down. …And they stayed with me for a bit. Yes. Then you have to get over it, put it behind you.

Theme 1.3: Informal caregivers

Involvement of the informal caregiver in the rehabilitation process can have a positive effect. Participants see benefits in terms of increasing understanding for the situation of the rehabilitant, creating confidence, and providing additional exercise moments. As a rehabilitant with a lower limb amputation said,

And then, for example, I went home last weekend. … And then she does things that annoy me, that I don't think are necessary. But she's so scared because she doesn't know what I am able to. But if they've already helped here a few times, then they gain confidence in the person.

And as an informal caregiver said about his wish to exercise together with his spouse,

Of course, therapy doesn't go on all day. So, if you can overcome that yourself by doing other exercises. That sounds like a good idea, yes.

The extent to which informal caregivers can provide support is determined by their resilience, but also by their relationship with the rehabilitant. As an informal caregiver explained, it is often quite normal for a spouse to be involved in the rehabilitation process,

Well, look, you hear the word 'informal carer' a lot. But I do not consider myself a carer. ... For my wife, who is going through a difficult time. You just do a bit more, no big deal.

Theme 1.4: Communication

Adequate communication is important, as a rehabilitant with acquired brain injury mentioned,

> *But I think the most important thing in the whole rehabilitation process is to communicate. Look at the person in front of you. Really look. Because that's.... And I think 80% of the time it's OK. But 20% of the time it hurts so much.*

As an informal caregiver explained, special attention is needed for communication with the informal caregivers, especially if the rehabilitant cannot oversee his rehabilitation process,

> *Yes, I just wanted an impression of how she was doing. She wasn't able to provide that.*

As a rehabilitant with acquired brain injury indicated, it is also important to provide information about the disease,

> *I thought it was very important that I got a lot of explanations about what's wrong. That it was explained. So I could understand myself.*

Theme 1.5: Exercise

Most participants would like to see a higher intensity of therapeutic activities. One way to achieve this is group training. Participants with experience in group training are very positive about it, like this rehabilitant with a traumatic fracture,

> *I think the advantages are that you see that you are not the only one stumbling around and tired after cycling for a little while. And that does tell you, you think well he can do it, so I can do it too. That is encouraging.*

But rehabilitants without experience in group training cannot see how it can be tailored to a rehabilitant's needs, like this rehabilitant with a lower limb amputation,

> *Not if it is not tailored specifically to the patient, then group therapy is not.... If it's all the same patients....*

Participants see an important role for nurses in stimulating and supporting rehabilitants by practicing meaningful tasks outside therapy moments. As one rehabilitant with traumatic fracture said, therapy moments can be created in all daily activities,

> *But going alone is always therapy. So also sitting down in the chair and everything. At some point all of it is therapy.*

Rehabilitants think it is important to do patient-regulated exercises, but they want advice concerning safety of the exercises and prevention of overburden. For example this rehabilitant with a traumatic fracture, who thinks rehabilitants can be afraid to practice alone in the therapy room,

> *I would love to, but then I would want someone there to see what you are going to do. I wouldn't dare to do it on my own, just....*

Theme 1.6: Peer support

Peer support is important for support, motivation, learning, putting things in perspective, and recognition. As a rehabilitant with acquired brain injury said,

> *And that's why it's so nice to be with people who have the same problem and you don't have to explain anything, they just understand. That always feels so relaxed.*

Theme 1.7: Daily schedule

Participants prefer to have input in the planning of their therapy moments and have these moments well spread in intensity throughout the day. In addition to

therapy, they would appreciate the possibility to do activities, as an informal caregiver explained,

You could see it in several people. That, in fact, outside therapy there was a sense of aimlessness. It wasn't the active feeling of 'I'm doing rehab now'.

Theme 1.8: Nutrition

Attention for good and tasty nutrition is important in a rehabilitation process, as one rehabilitant with a lower limb amputation explained,

> *Eating well is also therapy. You need the energy to be able to do your therapy. I need my breakfast and my food for the diabetes. But I also need to do therapy.*

Mealtimes can play a role in task-oriented training but are also important to stimulate contact between rehabilitants and create a good ambiance. As a rehabilitant with acquired brain injury mentioned,

> *But I think that for some people, because of course their rehabilitation takes a long time and they are alone. …. Then it's nice when you don't feel that you're eating alone on top of all that.*

Theme 1.9: eHealth

eHealth is defined as "the use of digital information and communication to support and/or improve health and health care."[15] Participants do think eHealth can make the rehabilitation process more fun, stimulate doing exercises and provide safety. But they do not think eHealth is always a necessary add-on to the rehabilitation process, as this informal caregiver summarized,

> *Depending on what those technical things are for, of course. If the technical things contribute more to the recovery of the patient than the non-technical things, then I am all for the technical things. But if it doesn't add much value, then I think well…*

Category 2: Themes involving organizational processes

This category consists of four main themes, namely 1) environmental aspects, 2) staff aspects, 3) organizational aspects, and 4) return home.

Theme 2.1: Environmental aspects

A rehabilitation center should be close to the residence of a rehabilitant. The wards should be small, with a shared living room and the possibility to go outside. The wards should provide practice options for the rehabilitants, such as aids required for rehabilitation, but also sufficient space to practice. As an informal caregiver said, it would be helpful if the therapy rooms are integrated in the ward,

> *I imagine a rehabilitation department, which is fully integrated. Everything in one place.*

For rehabilitants with acquired brain injury, it is important to have low-stimulus areas on a rehabilitation ward. Individual bedrooms provide a low-stimulus area, exercise options, privacy and coping opportunities. As a rehabilitant with a lower limb amputation said,

> *Just single rooms, so you can also deal with your emotions.*

Theme 2.2: Staff aspects

Professionals working on a rehabilitation ward must have an empathic way of working, be able to support rehabilitants emotionally, and stimulate rehabilitants to practice. As an informal caregiver said about the desired attitude of professionals,

> *Striving for independence, in an active way.*

Professionals must have good communication skills to communicate with rehabilitants and informal caregivers and within the team. Participants prefer small teams. This stimulates collaboration among professionals who feel they are responsible for the rehabilitation process.

Theme 2.3: Organizational aspects

Participants see a high workload for the professionals and feel that, because of cutbacks in funding, they are mainly working towards a short length of stay. They are afraid of negative consequences for their rehabilitation, although they are in favor of efficiently organized rehabilitation to achieve optimal results.

Theme 2.4: Return home

Although home visits during the rehabilitation can be confronting, participants find them useful. As an informal caregiver related about home visits,

> *Because then he could anticipate what it was of course. But it [home visit] was very painful for him, he found it terribly painful.*

All participants are aware that rehabilitation continues after discharge. Therefore, a good and timely transfer between settings is necessary. Participants are not sure whether rehabilitation at home or on a ward is better at the start of the rehabilitation process. Some participants think the length of stay is too short. One informal caregiver said about a longer stay,

> *Well, I thought it would have been better. That he would feel safer. Yes, that's what I think. That this is just too short.*

And others want to keep their time on the ward as short as possible, like a rehabilitant with multiple fractures,

> *Yes, the time I am here.... I want to keep it as short as possible. Yes, I do.*

Discussion

In this article for the first time the perspectives of rehabilitants and informal caregivers regarding a Challenging Rehabilitation Environment are described. Themes identified can be divided into factors concerning the rehabilitation process and factors concerning organizational processes. Regarding the rehabilitation process, we found nine themes: 1) rehabilitant, 2) rehabilitant centered, 3) informal

caregivers, 4) communication, 5) exercise, 6) peer support, 7) daily schedule, 8) nutrition, and 9) eHealth. Four themes were identified regarding organizational processes: 1) environmental aspects, 2) staff aspects, 3) organizational aspects, and 4) return home.

Rehabilitants and informal caregivers experience a lack of attention for neuropsychiatric symptoms during the rehabilitation process, e.g. altered stimulus processing, overburden, decline of executive functions, dealing with emotions, loss of memory, and loss of initiative. They want professionals to provide information about these symptoms repeatedly and in different ways, e.g. written, oral or audio-visual. Recent literature has shown that neuropsychiatric symptoms like depression, disinhibition and anxiety are highly prevalent in rehabilitants, and these symptoms are negatively associated with quality of life and home discharge after rehabilitation.[16-20] Information about neuropsychiatric symptoms and their treatment may result in better rehabilitation outcomes. Therefore, we recommend that professionals in geriatric rehabilitation receive training on neuropsychiatric symptoms, which enables them to provide relevant information to rehabilitants and informal caregivers.

Participants in this study emphasized tailoring the whole rehabilitation process to their specific situation. They see value in being involved in the process of goal setting. Wade and Holstege et al. describe that rehabilitation has to be tailored to the needs, goals, and wishes of the individual rehabilitant.[21,22] In a recent meta-analysis, the importance of shared decision making was seen as a way to respect the preferences, values, and autonomy of rehabilitants.[23] In the review of Vaalburg et al., the authors described the importance of involving rehabilitants in the process of setting meaningful goals.[24] Tailoring the rehabilitation process to the personal situation of the rehabilitant, by means of goal setting is recommended, e.g. when developing the treatment plan in the first week of admission.

Not all rehabilitants are aware that therapy includes all activities that promote rehabilitation rather than only activities with the physical therapist. Moreover, group training is a way to increase intensity of therapy, and rehabilitants with group training experience are positive about this kind of therapy, whereas rehabilitants without experience cannot imagine it being effective. These factors

seem to indicate the currently insufficient communication on these aspects and the types of therapy, although rehabilitants and informal caregivers emphasize the importance of good communication during the rehabilitation process. This includes communication about their rehabilitation process, diagnoses, and practical aspects such as the daily routine on the ward. Literature has shown that a lack in communication has a negative effect on the rehabilitation process, as the personal needs of rehabilitants are unclear to the professionals.[25] Good communication is complex and there can be multiple barriers and facilitators related to organization, staff, and rehabilitant factors.[26] Barriers can, for example, relate to mixed wards, power imbalance between staff and rehabilitants, staff perception of time pressures, personality, lack of knowledge and skills regarding communication, or a rehabilitant's functional and medical status. Examples of facilitators are shared rooms, staff knowledge and utilization of communication strategies, and personality of staff.[26] This emphasizes the complexity and importance of communication, so rehabilitants know what to expect in a CRE and what they can do themselves. Therefore, when implementing a CRE, attention must be paid to all these aspects of communication. Consideration should be given to optimizing the physical environment and training staff in communication skills.

Participants in the current study see peer support as important for learning from each other, but also for support and recognition. For example, group training stimulates peer support and learning from each other, and peer support facilitates rehabilitants' and caregivers' adaptation to long-term disabilities.[27,28] Group training and peer support during the rehabilitation process may result in better rehabilitation outcomes. We therefore recommend professionals stimulate group training, and peer support in a CRE.

Participants support the planning of therapy moments, so they can arrange visits around the therapy moments. Working with individualized timetables for rehabilitants and structured activities can increase a rehabilitants' activity during inpatient rehabilitation.[29] It is important to tailor the therapy moments to the needs of the rehabilitant, and therefore to follow the daily rhythm of rehabilitants with practicing meaningful tasks at the moment these tasks occur. We recommend providing clarity to rehabilitants about the day structure and possibilities

to arrange visits. In addition, therapy moments should follow the rhythm of the rehabilitant during the day.

This is the first study into the perspectives of rehabilitants and informal caregivers regarding CRE. The strength of this study is the variety of informal caregivers and rehabilitants included. All participants had recent experience with rehabilitation (and different diagnoses and ages), but were in different phases of their rehabilitation process, resulting in a good mix of participants. The use of focus groups stimulated the exchange of ideas, which also resulted in new ideas. Participants were asked for topics they thought were important for a CRE, even topics that were not mentioned by the researchers. In this way it was ensured that all relevant topics were discussed and the internal validity of the study was increased. In this study, 15 rehabilitants and 6 informal caregivers from the Netherlands participated. In order to increase the external validity of the study, participants were included until data saturation was achieved. Although all rehabilitants rehabilitated in Dutch rehabilitation institutions, it is likely that results can be generalized to other countries.

A limitation of our study is that, due to COVID-19, we were unable to include more informal caregivers in focus groups and had to switch to telephone interviews. This limited the discussion between participants, but these informal caregivers were able to express their own ideas regarding CRE without interruption. The results of these telephone interviews were in line with the results of the focus groups. Therefore, we expect that this adjustment had no effect on the results of this study and that the outcomes are broadly supported by informal caregivers and rehabilitants.

The second limitation of our study, is that most of the informal caregivers were caregiver of a rehabilitant with a brain injury. The perspectives of the informal caregiver from a rehabilitant after a trauma were in line with the perspectives of the informal caregivers from rehabilitants with brain injury. Also, the perspectives of the rehabilitants themselves with and without brain injury were comparable. Therefore, we expect that this distribution had no effect on the results of this study.

Conclusion

Based on this study, 13 themes were identified for modeling CRE in the perspectives of rehabilitants and informal caregivers. It is important to stimulate rehabilitants to be as active as possible during their rehabilitation and to tailor the rehabilitation process to the individual rehabilitant. Therefore, organizing excellent rehabilitation care requires a thorough understanding of the concept of CRE, since it is a complex and comprehensive concept that concerns the whole rehabilitation process. Its effectiveness and efficiency should be researched in prospective studies.

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Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethical Statement

The Medical Ethical Committee of the Leiden University Medical Center has assessed the study protocol for this study and concluded that the Medical Research Involving Human Subjects Act does not apply to this research project and has therefor issued a waiver of consent (N19.024).

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Appendix 1. Topic list

- What do you think about how your rehabilitation process was structured?
- What made you feel that you were or were not stimulated to work on your rehabilitation yourself?
- What do you think are important components to make your rehabilitation a success?
- Additional topics to discuss in relation to CRE:
  - Therapy intensity
  - Task-oriented exercise
  - Group training
  - Patient-regulated exercise
  - Learning styles and approach
  - Goal setting
  - Team dynamics (multidisciplinary, interdisciplinary)
  - Technologies
  - Enriched environment
  - Informal caregiver participation
  - Diagnoses
  - Nutrition

Supplemental table

Supplemental table 1 COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

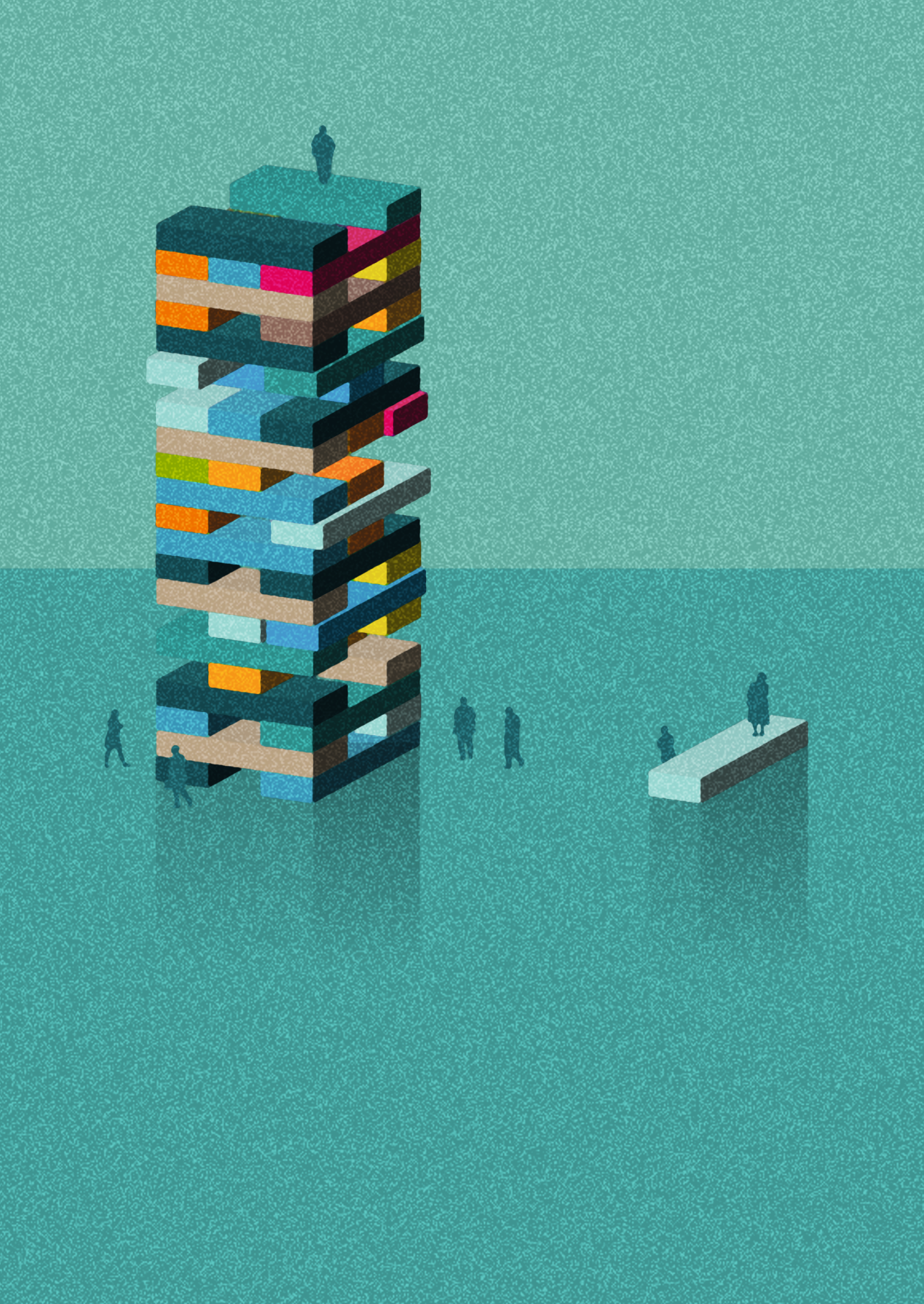
Topic	Item No.	Guide Questions/Description	Reported in chapter
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	Data collection
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	Data collection
Occupation	3	What was their occupation at the time of the study?	Data collection
Gender	4	Was the researcher male or female?	Data collection
Experience and training	5	What experience or training did the researcher have?	Data collection
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	Data collection
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Data collection
Interviewer characteristics	8	What characteristics were reported about the interviewer/ facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Data collection
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Study design
Participant selection			

Supplemental table 1 COREQ (COnsolidated criteria for REporting Qualitative research) Checklist *(continued)*

Topic	Item No.	Guide Questions/Description	Reported in chapter
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Recruitment of participants
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	Recruitment of participants
Sample size	12	How many participants were in the study?	participants
Non-participation	13	How many people refused to participate or dropped out? Reasons?	participants
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	Data collection
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	Data collection
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	participants
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Data collection
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	Participants
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	Data collection
Field notes	20	Were field notes made during and/or after the interview or focus group?	Data collection
Duration	21	What was the duration of the interviews or focus groups?	Data collection
Data saturation	22	Was data saturation discussed?	Data analysis

Supplemental table 1 COREQ (COnsolidated criteria for REporting Qualitative research) Checklist *(continued)*

Topic	Item No.	Guide Questions/Description	Reported in chapter
Transcripts returned	23	Were transcripts returned to participants for comment and/or correction?	Data collection
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	Data analysis
Description of the coding tree	25	Did authors provide a description of the coding tree?	Data analysis
Derivation of themes	26	Were themes identified in advance or derived from the data?	Data analysis
Software	27	What software, if applicable, was used to manage the data?	Data analysis
Participant checking	28	Did participants provide feedback on the findings?	Data collection
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/ findings? Was each quotation identified? e.g. participant number	Results
Data and findings consistent	30	Was there consistency between the data presented and the findings?	Results
Clarity of major themes	31	Were major themes clearly presented in the findings?	Results
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	Results



Chapter **4**

A qualitative study exploring professional perspectives of a Challenging Rehabilitation Environment for geriatric rehabilitation

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Abstract

There is a trend towards the formalization of the rehabilitation process for older rehabilitants in a Challenging Rehabilitation Environment (CRE). This concept involves the com-prehensive organization of care, support, and environment on rehabilitation wards. So far, literature on the principles of the CRE is scarce. This study aims to explore the perspectives regarding the CRE of healthcare professionals through a qualitative study. Therefore, between 2018 and 2020, six international and 69 Dutch professionals were interviewed in focus groups, and 180 professionals attended workshops on two Dutch congresses. Data were thematically analyzed using ATLAS.ti. Seven themes emerged regarding the rehabilitation processes: (1) rehabilitant (attention for cognitive functioning and resilience); (2) goals (setting personal goals); (3) exercise (increasing exercise intensity); (4) daily schedule (following the daily rhythm); (5) involving the client system (involving informal caregivers); (6) nutrition (influences rehabilitation capability); and (7) technology (makes rehabilitation more safe and challenging). Regarding organizational aspects, four main themes were identified: (1) environmental aspects (encourages exercises); (2) staff aspects (interdisciplinary team); (3) organizational aspects (implementing CRE requires a shared vision); and (4) factors outside the ward (a well-prepared discharge process). To offer effective rehabilitation, all elements of the CRE should be applied. To improve the CRE, specific interventions need to be developed and implemented. Consequently, the effectiveness and efficiency of the CRE need to be measured with validated tools.

Keywords

geriatric rehabilitation, challenging rehabilitation environment, post-acute care, care process

Introduction

Rehabilitation involves the identification of a person's problems, challenges, and needs. This leads to defining rehabilitation goals and subsequent interventions offered by a multidisciplinary team.[1] Persons undergoing rehabilitation are trying to adapt and self-manage their current condition, and, in line with the ideas of Huber et al. on positive health, the term "rehabilitants" is therefore more appropriate than the term "patients".[2]

A specific form of rehabilitation is geriatric rehabilitation (GR), which has recently been defined as 'a multidimensional approach of diagnostic and therapeutic interventions, the purpose of which is to optimize functional capacity, promote activity and preserve functional reserve and social participation in older people with disabling impairments'.[3] Rehabilitation for older people is even more challenging than for younger persons. With the ageing of the population, the demand for GR in Europe has increased.[4] In 2019, 53,320 rehabilitants in the Netherlands were referred to GR.[5] After hospitalization on an acute geriatric ward in Italy, 11% of patients aged ≥ 75 years were referred to a rehabilitation unit.[6] Common reasons for hospitalization in older persons are cardiac events, infections, fall-related injuries, stroke, cancer, or medical/surgical interventions.[7]

In the Netherlands, there is a trend towards having the rehabilitation process take place within the context of a challenging rehabilitation environment (CRE). A CRE is a widely accepted practice-based innovation in the Netherlands.[8-10] It is a unique concept which is positioned on the rehabilitation ward, covering all rehabilitation aspects that possibly influence rehabilitation outcomes. The concept involves the comprehensive organization of care and support by the rehabilitation team as well as the environment in which the rehabilitation takes place.[8,11] In comparison to regular rehabilitation (with mostly mono-disciplinary goals and interventions), in a CRE, the rehabilitation interventions are integrated into all aspects of the day and daily life, and the rehabilitation process is offered in an interprofessional way, with team and rehabilitant goals and interventions.[12]

A review conducted by the authors initially identified seven main components for modelling CRE: (1) therapy time; (2) group training; (3) patient-regulated exercise;

(4) family participation; (5) task-oriented training; (6) enriched environment; and (7) team dynamics.[11]

Although internationally there is a growing interest in the principles of this relatively new concept, there is no official scientific-based definition of the CRE. This results in considerable differences between rehabilitation wards in the interpretation of rehabilitation in general and the execution of a CRE specifically. Because of these differences in interpretation, the seven mentioned components are not guaranteed to cover all aspects of the CRE, and the question emerges regarding which aspects are found to be relevant by stakeholders besides the seven aspects found in the literature.

To date, no evidence-based conceptualization of CRE has been developed, and empirical evidence for the added value of CRE for rehabilitants is lacking. The current study is part of the CREATE study (Challenging REhAbiliTation Environment).[13] In this part of the CREATE study, we explore the perspectives of professionals regarding CRE.

Methods

Study Design

To explore the perspectives of professionals on the concept of the CRE, a qualitative study consisting of focus groups and workshops was performed between September 2018 and January 2020. The primary aim of qualitative research is to gain a better understanding of a phenomenon through the experiences of those involved.[14] As not all components relevant to CRE are identified, a qualitative study is indicated to gain a better understanding of the concept of the CRE. A waiver of consent was issued by the Medical Ethical Committee of the Leiden University Medical Center. This study did not apply to the Medical Research Involving Human Subjects Act (N19.024).[11,13]

We adhered to the consolidated criteria for reporting qualitative research (COREQ), which aim to improve the quality of reporting this type of research (see Supplemental table).[15]

Recruitment of Participants

Participants were eligible if they had recent experience in the field of (geriatric) rehabilitation and were willing to sign an informed consent form after receiving verbal and written information on the study.

During the recruitment phase, we aimed at obtaining input from different professional disciplines in the broad field of rehabilitation, e.g., medical doctors, physical therapists, occupational therapists, psychologists, speech and language therapists, and nurses, as well as researchers in the field of GR.

Recruitment for the focus groups was split into three target audiences: experts, (para)medics, and nursing staff. This subdivision was made to ensure that all participants were able to express their perspectives, regardless of educational or hierarchical issues.

At the start of the study, we composed a list of 31 Dutch national experts in the field of (geriatric) rehabilitation. These experts were invited by email to participate and were asked to supplement the list with names of people they regarded as experts. This resulted in a list of 38 people who were invited to participate in these focus groups.

Furthermore, an international focus group was established with non-Dutch members of the Special Interest Group Geriatric Rehabilitation (SIG GR) of the European Geriatric Medicine Society (EuGMS).[16] Fourteen members were asked via email to participate in a focus group during the EuGMS congress 2019 in Krakow. The audience of the symposium of SIG GR at this congress was also invited to participate in this focus group.

Organizations affiliated with the six academic networks for elderly care in the Netherlands were approached by email with information about this study.[17] They were asked to participate in this study and to delegate professionals working in the rehabilitation field to attend the focus groups.

We aimed for data saturation, and after each focus group, the authors discussed whether any new topics had emerged. Inclusion stopped when all disciplines were represented in focus groups and no new topics emerged.

Additionally, the study group was asked to organize four workshops concerning the theme CRE during two Dutch national congresses in the field of rehabilitation. This opportunity was used to ask the participants of these congresses to provide input on topics relevant to CRE. Visitors of these congresses were able to register for these workshops, and they were informed that their input was used for the conceptualization of CRE. Participation in the workshops was voluntary, and no personal information was collected.

Focus Groups

The aim of the focus groups was to clarify the perspectives of the participants regarding CRE. The groups were chaired by E.D. or B.B., and L.T. took field notes during the group interviews. E.D. and B.B. are both female senior nursing researchers in the field of rehabilitation. Both are experienced in qualitative research and chairing discussion groups. Physical therapist L.T. is a female PhD student with formal training in interview techniques and qualitative research and has 10 years of experience in geriatric rehabilitation.

In preparation for these groups, L.T. developed a topic list (Appendix) based on an earlier literature review on CRE.[11] This topic list was piloted with a group of researchers. The content of the topic list was determined in an iterative process and adapted based on the previous pilot and focus groups.

The focus groups for Dutch experts were held in a meeting center centrally located in the Netherlands. The international expert group was held at the congress location of EuGMS 2019, Krakow. The focus groups for the other professionals were conducted at meeting centers and rehabilitation wards spread across the Netherlands. All focus groups took place in meeting rooms, and only the participants and researchers were present.

Each focus group began with a brief introduction to the study and the topic of the focus groups, followed by the introduction of the individual participants. The

participants were then asked to share their perspectives on CRE. The chair asked open-ended questions based on the topic list to keep the conversation going. To increase the internal validity, participants were also asked to share their perspectives on subjects that were not included in the topic list but which they considered important regarding CRE.

On average, the duration of the focus groups was 110 min, and they were audiotaped and transcribed verbatim by L.T. Transcripts were not returned to participants for comments, but at the end of every focus group, the chair presented a verbal summary and checked its accuracy with the participants.

Workshops

Four 50-minute workshops were held at two Dutch national congresses in the field of rehabilitation. Each workshop started with a presentation by L.T. about the results of the review on CRE.[11] Participants were informed of the purpose of this qualitative study, and after the presentation, the participants split into groups of 8 persons on average. In these groups, they discussed one of four questions compiled by the researchers regarding CRE. L.T. and B.B. guided these discussion rounds, and participants were asked to summarize the results of their discussion on a flipchart and present them to the other participants. These flipcharts were digitized and used as an input for data analysis.

Data Analysis

Parallel to the data collection, we performed a thematic analysis to identify, analyze, and report patterns in the data.[14,18] For coding of the data, ATLAS.ti version 7.5 was used.

L.T. familiarized herself with the data by reading and re-reading the transcripts, after which initial themes were identified using an open-coding approach. These initial themes were checked and coded by B.B. and E.D. to determine inter-rater agreement. Differences in the coding were discussed by L.T., E.D., and B.B. until an agreement was reached. Each initial theme was described in a memo.

The identified initial themes were combined into main themes with associated sub-themes. The connections and contradictions between the initial themes were

described per main theme and connections between main themes were described in categories.

Each main theme was assessed for data saturation by checking whether no new data emerged in the focus groups or workshops. Subsequently, the research team discussed the main themes. After an agreement was reached, each main theme was thoroughly described, and relevant quotes were identified and translated into English.

Results

Participants

Between September 2018 and October 2019, a total of 13 focus groups were conducted: one international expert group (n = 6), three national Dutch expert groups (n = 17), three (para)medics groups (n = 24), and three groups with nursing staff (n = 28). Eleven of the invited Dutch experts and eight of the invited international experts were not able to participate. Reasons for not participating were time management concerns, not being present at EuGMS congress 2019, or having the impression of not having sufficient knowledge about the subject.

The workshops were held in November 2019 and January 2020. A total of 180 rehabilitation professionals participated in these workshops. Characteristics of the participants are shown in Table 1.

Table 1. Characteristics of participants.

Expert Groups (n = 4, participants = 23)		
Nationality	Netherlands	17
	Greece	1
	Germany	2
	Australia	2
	Poland	1
Occupation *	Elderly care physician	5
	Rehabilitation physician	4
	Physical therapist	11
	Lecturer	2
	Researcher	11
	Manager	8
	Nurse (practitioner)	2
Focus Group (para) medical (n = 3, participants = 24)		
Occupation	Elderly care physician	3
	Occupational therapist	5
	Nurse practitioner	3
	Physical therapist	8
	Psychologist	1
	Speech and language therapist	3
	Head of nursing staff	1
Focus Group Nursing Staff (n = 3, participants = 28)		
Occupation	Nurse	22
	Nurse assistant	4
	Nurse aid	2

Workshops (n = 4, participants = 180 healthcare professionals, e.g., physical therapist, occupational therapist, elderly care physician, nurse)
* Participants indicated combinations of occupations.

Themes

Eleven main themes with associated sub-themes emerged from the data. The main themes can be divided into two categories, namely themes involving rehabilitation processes and themes involving organizational aspects. The subdivision of the themes within the two categories is described in Tables 2 and 3. The two categories are described in the following paragraphs.

Table 2. Themes involving rehabilitation processes.

Main theme	Brief description	Sub-theme	Description
Rehabilitant	CRE is suitable for all diagnosis groups. Attention to rehabilitants' cognitive functioning and resilience and stimulating the self-reliance of rehabilitants are necessary.	Characteristics	Rehabilitants undergo rehabilitation for different diagnoses, e.g., in the fields of neurology, orthopedics, and trauma. They often have multiple diagnoses and are already experiencing a functional decline in the home situation. They are often not familiar with using technologies to perform exercises. Traditionally, rehabilitants and informal caregivers expect to be taken care of during their stay at the rehabilitation ward, and they do not expect to have to perform daily tasks themselves.
		Cognitive aspects	Often, rehabilitants suffer from cognitive problems or delirium. Besides already existing cognitive problems, cognition may decline as a result of the life event or diagnosis for which they are receiving rehabilitation. Neuropsychiatric symptoms such as depression or disrupted stimulus processing occur as a result of a neurological condition. It is important to be aware of these symptoms, as they can affect the rehabilitation process, but also acknowledge that this is an often underexposed and, as a result, under addressed aspect during rehabilitation. Adapting rehabilitation to the needs and learning style of the rehabilitant is important, and professionals must be aware that information and exercises must be offered in different ways.
		Resilience	Rehabilitants' resilience is often low, especially at the beginning of the rehabilitation process. Rehabilitants and informal caregivers need to understand and learn to deal with this. For balance, it is important to create rest moments for rehabilitants, and therapies must be spread out over the whole week, not just provided during working hours. Participants acknowledge this but have difficulty determining how much rest a rehabilitant needs and how to best provide it.
		Self-reliance	Although all participants consider it important that rehabilitants have self-management abilities and take control of their rehabilitation, not all rehabilitants are able to do this from the start. To be able to take control, rehabilitants must know what the possibilities are and have the opportunity to practice on their own as well as carry out their own planning. Rehabilitants' motivation can be improved if they know what is expected of them and what they are working for.

Table 2. Themes involving rehabilitation processes. *(continued)*

Main theme	Brief description	Sub-theme	Description
Goals	Individual goals are needed for the rehabilitation process in a CRE. Some rehabilitants need guidance in setting their goals. There is a desire for an appropriate set of measurement instruments for GR.	Goal setting	Shared goals for rehabilitation (rehabilitants, informal caregivers and professionals) are important. Not all rehabilitants are able to express their goals at the start, but with support from informal caregivers, relevant goals can usually be defined. Sometimes, their goals are unrealistic for their level of functioning. Goal setting in smaller steps, with good guidance and communication by the professionals and tailored to the rehabilitants' needs, will improve the chances that rehabilitants will achieve their goals. One of the main goals of rehabilitants is to work on self-reliance and independence to practice what they need to be able to go home. In addition, professionals should be aware of possible cultural differences in the importance of goals.
		Learning new skills	There is a discussion on teaching rehabilitants new skills. Society increasingly demands digital skills. Although the participants think inpatient rehabilitation is a good moment to learn these new skills, they also admit that not all rehabilitants are willing to learn these skills and rarely succeed in reaching a higher level of independence than before.
		Observation and measuring	A wide range of measurement instruments indicate the level of function of a rehabilitant, although not many instruments are validated in the population in GR. Therefore, functional observation (live or by recording) is still often used. Participants long for a set of measurement instruments appropriate for the population, which can be used to motivate and inform the rehabilitant about their progress.

Table 2. Themes involving rehabilitation processes. *(continued)*

Main theme	Brief description	Sub-theme	Description
Exercise	Exercise intensity in a CRE is as high as possible. This can be achieved by integrating task-oriented exercises, patient-regulated exercises and group training into the daily structure.	Exercise intensity	Exercise intensity should be as high as possible on all days of the week, based on the rehabilitant's ability. Currently, this intensity is often not high enough. Exercise intensity comprises all activities as part of the rehabilitation. Rehabilitants, informal caregivers and staff should be aware that it is not only the moments with a therapist that are important for the rehabilitation; they need to integrate training into their daily routine.
		Task-oriented exercises	Although you must sometimes start at the level of body functions, therapy in a rehabilitation setting aims at the participation level. Task-oriented exercise is in line with this. For example, tasks can be practiced in activities of daily living, at mealtimes and in hobbies. All staff must have the attitude and the time to stimulate rehabilitants to practice meaningful tasks, which are tailored to their home situation, throughout the day.
		Patient-regulated exercises	Patient-regulated exercises can increase exercise intensity and stimulate the rehabilitants' independence and self-management during rehabilitation. Homework exercises can increase the amount of patient-regulated exercise and can affect how rehabilitants continue to perform exercises after discharge. To stimulate patient-regulated exercise, 24/7 access to training facilities is desirable and informal caregivers and staff should stimulate rehabilitants to practice, although independent exercise is often at a lower intensity than supervised training.
		Group training	Group training can be an effective way to increase exercise intensity, but it should be compatible with the goals of the rehabilitant. Training in groups stimulates contact with and learning from others, prevents loneliness, and stimulates rehabilitation. Therefore, it is important that staff members stimulate a positive group process on a rehabilitation ward.

Table 2. Themes involving rehabilitation processes. *(continued)*

Main theme	Brief description	Sub-theme	Description
Daily schedule	Within a CRE, the entire day the team needs to be focused on rehabilitation and activities. Exercise is adapted to the pace of the rehabilitant.	Daytime activities	A daily schedule that challenges rehabilitants to take initiative and increase their exercise intensity is desired. When rehabilitants are too passive between therapy moments, this can sometimes lead to cognitive decline. Recreational activities not focused on the rehabilitation goals can keep the rehabilitants motivated, for example, activities with a game element. It is recommended to allow visitors/guests, other than the informal caregivers (who can assist during rehabilitation), only during predefined visiting times.
		Planning	Some rehabilitation wards work with a day planning for the rehabilitants in which all therapies are planned. Some rehabilitants and informal caregivers appreciate this planning, but it often causes problems. Because of external factors, such as hospital visits, the planning needs to be quite flexible. Working without a therapy plan enables responding to the rhythm of the rehabilitant and promotes interdisciplinary cooperation. In addition, it is desirable to have walk-in moments for the therapy so that rehabilitants can take control of when they practice, if they are able to.

Table 2. Themes involving rehabilitation processes. *(continued)*

Main theme	Brief description	Sub-theme	Description
Involving client system	Good communication is necessary to involve informal caregivers in the rehabilitation process. They can help in the rehabilitation process, but they should be prevented for overburdening.	Informal caregiver participation	The informal caregivers and their abilities and perceived burden partly determine whether a rehabilitant can go home. They can provide information about the rehabilitant's previous level of functioning and the goals for the rehabilitation. Although informal caregivers can be seen as fellow practitioners, who motivate and help during the rehabilitation process, staff must prevent overburdening them. Attention must also be paid to bereavement and the informal caregiver's need for information. Participants would like to see informal caregivers perform tasks in supporting the rehabilitant during rehabilitation similar to what they will be doing at home.
		Communication	Communication is a key aspect in involving informal caregivers. Rehabilitants and informal caregivers need to be informed about the principles of a CRE so that they know how important it is to practice during daily activities and which extra exercises they can perform during the rehabilitation process. This information must be presented in a way suitable for the rehabilitant and informal caregiver. It is also important to give information about the disease for which they are undergoing rehabilitation and about the new skills they must learn.
Nutrition	Nutritional status partly determines the rehabilitation capability, therefore a balanced diet is necessary.		A rehabilitant's nutritional status partly determines their rehabilitation capability. Rehabilitants are not always aware of this relationship and do not consume enough protein-rich foods. It is important to realize a balanced diet with products that are as common as possible, so rehabilitants will be able to continue the diet at home. Pleasant mealtimes stimulate good intake, and joint meals are therefore seen as standard. It is important to pay attention to the energy levels of a rehabilitant. Intake or swallowing can be negatively affected if a rehabilitant is too tired.

Table 2. Themes involving rehabilitation processes. *(continued)*

Main theme	Brief description	Sub-theme	Description
Technology	Technology develops very fast and contributes to safe and challenging rehabilitation.	Domotics	Domotics, e.g., systems to automatically measure body functions or fall signaling, can help to offer security, privacy, and night rest to rehabilitants and can also be time-saving for professionals. An important condition is that privacy is guaranteed and that the security of the system can also be guaranteed at home.
		eHealth	Although the use of eHealth is currently limited, it can be useful in the future as a supplement to exercising, monitoring, safety, and feedback options. Nowadays, many applications are not yet suitable for the target group or are not always applicable during functional activities. In addition, eHealth is developing very fast, making it difficult for healthcare professionals to keep abreast of all possibilities.

Table 3. Themes involving organizational aspects.

Main theme	Brief description	Sub-theme	Description
Environmental aspects	The environment on a rehabilitation ward is safe and invites rehabilitants to practice as much as possible.	Building aspects	The environment on a rehabilitation ward should resemble the domestic situation as much as possible so that rehabilitants feel stimulated, free, and able to practice meaningful, functional tasks. There should be therapy rooms on the ward for interdisciplinary team dynamics and the participation of informal caregivers. It is advisable to have the possibility to screen off part of the room for privacy. Walking distances to the bedrooms should be considerable, and there should be handrails, chairs, and exercise facilities in the corridors and a possibility to go outside. For different levels of stimulus processing, there must be variation in rooms with more and less stimulus. Opinions differ as regards the desire for single or multi-bedrooms. Single bedrooms offer privacy and a quiet environment, whereas multi-bedrooms offer contact with other rehabilitants. A sliding wall can offer a solution. The bedroom should be furnished in a way that the rehabilitant is stimulated to get out of bed.
		Ambiance	The ambiance should enthuse rehabilitants and make them feel safe enough to work on their recovery. Most participants think a cozy, homely ambiance is important to stimulate rehabilitants to practice, have contact with fellow rehabilitants, and encourage each other to practice. Relaxing activities should be scheduled in addition to therapy moments.

Table 3. Themes involving organizational aspects. *(continued)*

Main theme	Brief description	Sub-theme	Description
Staff aspects	All team members work in an interdisciplinary way and stimulate rehabilitants to practice throughout the day.	Team mix	The team should be sufficiently 'mixed' in terms of rehabilitation skills and experience. Recommended professionals in the rehabilitation team are: nurses, physical therapists, occupational therapists, psychologists, social workers, case managers, dieticians, speech and language therapists, physicians (elderly care or rehabilitation), and volunteers. Some participants think the nurse needs a name that better reflects the role of a therapeutic rather than caring nurse, for example, "rehabilitation coach". Regardless of the name, the nurse must be seen as a therapeutic team member.
		Team dynamics	In an interdisciplinary team, each discipline has expertise in a particular area, but team members can look beyond the boundaries of their own field. All disciplines are equal, and there is no (in)formal hierarchy. Working in smaller teams, taking courses together, and therapists working directly on the ward are ways to improve interdisciplinary dynamics. The rehabilitant and their informal caregiver must also be part of the team. Multidisciplinary consultation in the presence of the rehabilitant is preferred and is often used to coordinate rehabilitation goals.
		Attitude of staff	All employees should have an empathetic, motivating attitude in order to involve informal caregivers and stimulate rehabilitants to practice throughout the day. They, therefore, need to be able to see training opportunities in daily activities. The approach of the team is coordinated, so rehabilitants always know what to expect. Staff members ideally choose to work in the field of rehabilitation, are flexible, can set priorities, have an interdisciplinary mindset, and are stress resistant.
		Training requirements	Medical guidelines are not always suitable for geriatric rehabilitants. Staff must be able to deal with this by using evidence-based practice principles, building sufficient experience and having additional training in geriatrics.

Table 3. Themes involving organizational aspects. *(continued)*

Main theme	Brief description	Sub-theme	Description
Organizational aspects	Implementing a CRE requires a shared vision on rehabilitation, and a project group to supervise the process. Even though internationally the organizational aspects differ, the concept of CRE is suitable to get the most out of rehabilitation.	Vision	It is important that all professionals (including management) have a shared vision on geriatric rehabilitation and make informed decisions.
		Administration	Participants experience that too much time is spent on administrative tasks, partly due to incompatible systems and regulations—time that could be spent on the rehabilitants and their rehabilitation.
		Regulations and funding	Participants feel that the rehabilitation system is driven by the way it is funded, which differs internationally. Optimal rehabilitation cannot always be offered due to insufficient reimbursement. Unfavorable decisions are sometimes unavoidable within the therapies. Participants experience a negative effect of regulations regarding privacy and liability in the rehabilitation process.
		Safety	Participants think rehabilitants and informal caregivers need to be safe to practice. The approach of the professionals and the design of the building may affect this safety positively or negatively. Despite some international differences, participants agree that pushing the boundaries, taking calculated fall risk, and using technical innovations to prevent risks will improve rehabilitation.

Table 3. Themes involving organizational aspects. *(continued)*

Main theme	Brief description	Sub-theme	Description
		Different settings	There are international differences in the setting in which rehabilitation for older persons is offered, and whether it is separate from rehabilitation for younger adults. However, these differences are secondary: the concept of a rehabilitation environment must start at the hospital ward and should continue after discharge in a slightly modified form.
		Naming	Sometimes, the word rehabilitation "hotel" is used for a rehabilitation ward, which may create expectations of being pampered instead of there being hard rehabilitation work perform. Using the word "patient" emphasizes being ill. Using the word "person" or "rehabilitant" stimulates looking at a person's abilities.
		Implementation	Implementing a CRE requires a balanced team, and all team members must agree on the need for the implementation of a CRE. A project group or initiator should supervise the implementation of themes within CRE, work on time management and keep everyone enthusiastic. It takes a lot of time for a new method to become fully embedded in the daily routine.

Table 3. Themes involving organizational aspects. *(continued)*

Main theme	Brief description	Sub-theme	Description
Factors outside the ward	The discharge process must be well prepared and supervised. Home visits allow rehabilitants to practice meaningful tasks in their own environment and be prepared for discharge.	Outpatient rehabilitation	It is important to visit the home environment during inpatient rehabilitation because the situation at home can be different from the rehabilitation ward. It is best for rehabilitants to practice meaningful tasks in their own environment. However, some participants think rehabilitating in a good CRE can have added value.
		Discharge process	It can be beneficial to guide the transition home by continuing the rehabilitation process by the same professionals in outpatient rehabilitation. Rehabilitants and informal caregivers sometimes think they are not ready to be discharged, while professionals think they can manage at home. It is important to keep communicating about the discharge process. Additionally, longer rehabilitation can sometimes be beneficial to increase a rehabilitants' independence, which subsequently leads to lower healthcare costs in the long term.

Category 1: Themes Involving Rehabilitation Processes

This category consists of seven main themes: (1) rehabilitant; (2) goals; (3) exercise; (4) daily schedule; (5) involving client system; (6) nutrition; and (7) technology.

Theme 1.1: Rehabilitant

A CRE is suitable for all diagnosis groups, although the principles of CRE must be introduced to rehabilitants and their informal caregivers to stimulate self-reliance.

During the rehabilitation process, attention should be paid to potential cognitive problems, sometimes pre-existent or sometimes newly emerged. One nurse practitioner stated:

> *Especially in CVA patients, depression is quite common and very often underestimated. … But this has to be included, because if the mood is not right, there is a very negative impact on the rehabilitation process.*

As an elderly care physician said, it is important to take the rehabilitant's resilience into consideration in their day program:

> *But 1 time 24 minutes is not the same as 24 times 1 minute. And those 24 times 1 minute is what you want in a CRE. You can also spread patients with limited abilities over the day so that they can still continue in therapy, despite their limits.*

Theme 1.2: Goals

In GR, it is important to work on the rehabilitant's own goals for motivation, self-reliance and independence. Sometimes, rehabilitants need guidance from professionals or informal caregivers to describe their goals. A manager with a background as a physical therapist explained:

> *It starts with a good talk and actually motivating the rehabilitant. Everyone is motivated for something, but maybe not for your goals.*

Participants miss measurement instruments validated for the GR populations to measure the success of rehabilitation. As one rehabilitation physician stated:

> *I want to advocate defined clinimetrics. To inform [rehabilitants] properly and measure treatment success.*

Theme 1.3: Exercise

To achieve the highest possible exercise intensity, training moments must be integrated into the daily routine. With task-oriented exercises, rehabilitants train meaningful tasks aimed at a participation level. A rehabilitation physician explained:

> *So, the question is, how do you integrate exercise components in the daily routine. .... So, I think, this is really, let's say, the big picture. That we have to change the climate of how we work with the people.*

Patient-regulated exercises can increase the exercise intensity and stimulate the rehabilitants' independence. If group training is focused on the goals of a rehabilitant, it can increase the exercise intensity and stimulates contact with other rehabilitants. An elderly care physician said:

> *I think group therapy can be very efficient. ... It may help when people practice in a group and you have peer support.*

Theme 1.4: Daily Schedule

Within a CRE, across the entire day, all activities should be focused on rehabilitation, and those activities should be stimulated.

Participants are in favor of working without strict planning to be able to respond to the rhythm of the rehabilitant and stimulate interdisciplinary cooperation. As a nurse mentioned:

> *I would prefer to have one occupational therapist and one physiotherapist on the ward structurally. Who can just help out on the ward from morning to evening, and at the same time provide therapy.*

Theme 1.5: Involving Client System

The client system can be seen as fellow practitioners in the rehabilitation process, but staff must guard against overburdening the informal caregiver. One nurse and lecturer explained:

> *I do think it's important that the family caregiver has a place and is a natural part of the whole. I also think it's very important that we are aware that, from the family caregiver's perspective, there is no end to it.*

To be able to involve the informal caregivers in the rehabilitation, communication is a key aspect. As an elderly care physician and researcher said:

> *What I also see a lot … is that even for family caregivers it is often unclear what they should expect. What the approach will be and what the goal of the rehabilitation ward is. In addition to everything we have already said, I think that explaining and providing information is also an important part of the rehabilitation climate.*

Theme 1.6: Nutrition

The nutritional status of a rehabilitant partly determines their workload capacity. So, attention to a protein-rich diet with the most common products possible is important. One elderly care physician mentioned the importance of nutrition:

> *Nutritional status is another one. Yes, it's getting more attention now, but it has been underexposed for a very long time I think. And also the link with people sometimes just being too tired to eat properly. And I'm not even talking about the quality and how tasty it is, so to speak.*

Theme 1.7: Technology

Technology develops very fast and contributes to safe and challenging rehabilitation. Currently, eHealth is not often used in the GR, but as one nurse practitioner summarized:

> *Well, it has a lot of potential, but the tricky thing is, there are so many applications. Remember you are dealing with elderly people who have difficulty*

with technology and you have to organize your whole care process in such a way that the technology takes this into account. So, to implement it properly, there are quite a few conditions to meet.

Category 2: Themes Involving Organizational Aspects

Four main themes belong to this category: (1) environmental aspects; (2) staff aspects; (3) organizational aspects; and (4) factors outside the ward.

Theme 2.1: Environmental Aspects

The environment on a rehabilitation ward must be safe and must invite rehabilitants to practice as much as possible. As one physical therapist said about the building aspects of a rehabilitation ward:

It is an interaction of a warm environment that is very stimulating and invites to start doing the things required to be able to go home.

It is important that the environment resembles the domestic situation as much as possible, and everyday equipment is used. The environment should stimulate rehabilitants to practice as much as possible, and rehabilitants must have access to exercise materials all day. This can be achieved by providing exercise opportunities in the corridors and possibilities to go outside. As one manager said:

When you get to the point in the rehabilitation process that you are able to practice independently on the parallel bars, then you want to do that as often as possible, I'd think. I would like to have that nearby or be allowed to go there on my own to practice. Then I can imagine it being on the ward is convenient.

Theme 2.2: Staff Aspects

A rehabilitation team must work in an interdisciplinary way, and the rehabilitant and their informal caregiver are seen as part of the team as well. As an elderly care physician explained:

If you are referring to interdisciplinary working. That's a core concept in rehabilitation. You have the specialist expertise in all fields, but you also have to know and be able to borrow from each other's expertise a little bit.

All employees must have an emphatic, motivating attitude and stimulate rehabilitants to practice throughout the day. As a rehabilitation physician stated:

> *I think, particularly nursing staff having a rehabilitation focus, and so, encouraging for the patients to do everything possible they can, from the start. So, that may make a significant difference.*

As rehabilitants in the GR do not always fit in medical guidelines, staff must be able to work based on the ideas of evidence-based practice. As one physical therapist said:

> *That is the problem with the application of such a guideline. For example, the guideline says it's for stroke, but if someone also has Parkinson's, or broke his hip last year, you cannot do certain tests. Because it's obviously impossible.*

Theme 2.3: Organizational Aspects

Even though internationally organizational aspects differ and can therefore influence the rehabilitation process, the concept of CRE is suitable to get the most out of rehabilitation. Implementing a CRE requires a shared vision on rehabilitation and a balanced interdisciplinary team with sufficient time for the implementation. As a nurse practitioner said:

> *I do think when you have that kind of project group, it does involve regular evaluation. Like, guys, how are the things we started going now? And do we need to adjust, fine-tune anything.*

CRE does not depend on the rehabilitation setting, as long as the name of the ward does not generate false expectations. It is also important that rehabilitants are not addressed as patients. As a nurse lecturer said:

> *Calling someone patient or client, you emphasize what a person can't do. If you say person, you avoid this label. It is still someone who tries to live his life in the best way possible.*

Theme 2.4: Factors Outside the Ward

The discharge process must be well prepared and supervised. Home visits allow rehabilitants to practice meaningful tasks in their own environment in preparation for their discharge. One manager with a background as physical therapist mentioned:

> *It also helps to have people actually go home during rehabilitation. This provides so much information about how they actually function at home. A situation is always different at home.*

Although participants think it is a good idea to organize rehabilitation in the home situation as soon as possible, they also doubt whether it is better to keep rehabilitants on the rehabilitation ward for longer. As an elderly care physician said:

> *The question is, if you have a ward with a very good rehabilitation climate, would you not want to admit patients there who, in terms of their care needs, could go home, but for whom the added value of the rehabilitation climate for the rehabilitation is such, that patients choose to be admitted to the department for rehabilitation.*

Discussion

This article is the first to describe the perspectives of healthcare professionals in rehabilitation, concerning CRE. A set of seven factors concerning rehabilitation processes and four factors concerning organizational aspects emerged from the qualitative data. The results of this study are (partially) in line with our review on CRE and confirm the importance of increasing therapeutic intensity, the importance of patient-regulated exercise, group training and task-oriented training in a CRE. Involving informal caregivers, providing a challenging environment for rehabilitation, and a cooperating, motivating team are also aspects of a CRE. These factors, therefore, constitute challenges for a rehabilitation team to work on.[11]

Participants in the current study believe a CRE is suitable for all types of rehabilitants, but it has to be tailored to the resilience, goals, and cognition of the

rehabilitant. This is in line with recent literature, which states that rehabilitation is suitable for persons with all kinds of diagnoses when it is tailored to the needs, goals, and wishes of the individual rehabilitant.[19,20] This confirms the relevance of tailoring the rehabilitation process to the individual rehabilitant, which is the main challenge for professionals in a CRE.

The results of this study indicate that it is important in a CRE to work on a rehabilitants' own goals and to measure them with appropriate measurement instruments. Although a recent meta-analysis could not substantiate its added value, they do see goal setting as a part of shared decision-making and as a way to respect the preferences, values, and autonomy of rehabilitants.[21] A recent review endorsed the importance of personal, meaningful goals for rehabilitants and described the importance of involving rehabilitants in and informing them about the process of goal setting.[22] Although the added value of goal setting with the rehabilitant requires further research, both the literature and participants of this study consider it of interest in the rehabilitation process. Involving the rehabilitant in the goal setting in a CRE is therefore recommended.

Participants in this study feel that attention to the nutritional status of a rehabilitant is relevant and an optimal "food as usual" but protein-rich diet should be the goal. This is endorsed by recent literature that indicates that the nutritional status is significantly related to successful rehabilitation in older adults.[23,24] The results of this study and the literature indicate the importance of attention to the nutritional status of rehabilitants. Consequently, professionals in a CRE should measure the nutritional status and choose nutrition activities accordingly.

Although eHealth is currently not often used in GR, participants do see a lot of potential in eHealth for exercising, monitoring and safety during practice. Applications must be suitable for the target group. Systematic reviews show the benefits of eHealth for older persons in terms of increasing their physical activity, walking ability, and balance.[25-27] A recent review on eHealth in GR confirms the benefits of integrating eHealth in GR.[28] Although more research regarding eHealth in GR is necessary, the literature so far confirms the potential of eHealth for rehabilitants in GR. Therefore, eHealth may be an important aspect in CRE, and professionals should look for ways to apply eHealth in a functional way in a CRE.

A CRE can be negatively affected by organizational aspects such as funding, administrative tasks, and legal regulations, which can differ internationally. Participants think it is important that an organization has a shared vision on rehabilitation and there is sufficient time for implementing a CRE.

Implementing a complex concept such as the CRE should be based on an understanding of the behaviors that need to change, the relevant decision-making processes, and the barriers and facilitators of change. Monitoring during and after the implementation is crucial.[29] The literature confirms the idea mentioned by participants in this study regarding the complexity and barriers to implementing a CRE: successful implementation of a CRE on a ward requires a strategy and sufficient time for the implementation process.

Participants stressed the importance of practicing meaningful tasks in a rehabilitant's own environment and thus of rehabilitation in the home situation as quickly as possible. However, some are in doubt as to whether a longer stay on the rehabilitation ward is better if there is a good CRE. As the effectiveness and efficiency of CRE have not yet been studied, no statement can be made about the benefits of inpatient rehabilitation in a good CRE versus outpatient rehabilitation at one's own home. This needs to be the subject of further research.

The 11 themes that were identified form a rather complex concept. In general, the rehabilitation process should be individually tailored and optimized to achieve all the goals of the rehabilitant. Currently, all principles of CRE are used internationally in GR. However, the rehabilitation ward may not work according to all of the themes that are important for a CRE. Therefore, new interventions should be implemented and adapted.

The strength of this study is the number of participants. We interviewed more than 200 individuals, and data saturation was reached. Secondly, all professionals participating in this study had experience in the field of rehabilitation. The occupation of the participants was taken into account in the composition of the focus groups. Therefore, hierarchical differences did not prevent participants from discussing their ideas, although it also limited the exchange of ideas between groups. In the workshops, participants were mixed in smaller groups regardless

of occupation. The results of these workshops were in line with the results of the focus groups, meaning that occupation did not influence the results. The use of focus groups and workshops stimulated the exchange of ideas, which also resulted in new ideas. Participants were asked for subjects they thought were important for a CRE, even when not asked for by the researchers. In this way, it was ensured that all relevant topics were discussed and the internal validity of the study was increased.

A limitation of our study is that most participants are from the Netherlands and were somehow familiar with CRE ideas. This may limit the generalizability of the results to GR in other countries in which the concept of CRE is in its infancy. However, the topics discussed in the non-Dutch focus group at the 2019 EuGMS congress were in line with the results of the other focus groups. We, therefore, think that the identified themes are important for all rehabilitants in GR, regardless of the country in which they are rehabilitating.

Conclusions and Implications

Based on this study, 11 themes were identified for modeling a CRE. Overall, it is important to tailor the rehabilitation process to the rehabilitant and to stimulate rehabilitants to optimize their rehabilitation.

Since tailoring the rehabilitation process in a CRE to rehabilitants and their informal caregivers seems important, it is interesting to investigate whether these eleven themes are supported by the rehabilitants themselves and to find out if they consider other factors important for a CRE. According to the respondents, to offer effective rehabilitation, all elements of CRE should be applied, and specific interventions need to be developed and implemented. Consequently, the effectiveness and efficiency of CRE need to be studied with validated tools that are yet to be developed. In our ongoing research, we aim to develop those tools.

Author Contributions

Conceptualization, LT, ED, WA, and BB.; methodology, LT, ED, WA, and BB; software, LT, ED, and BB; validation, LT, ED, WA, and BB; formal analysis, LT, ED, and BB; investigation, LT, ED, WA, and BB; resources, LT, ED, WA, and BB ; data curation, LT, ED, WA, and BB; writing—original draft preparation, LT.; writing—review and editing, ED, WA, and BB; visualization, LT.; supervision, ED, WA, and BB; project administration, LT.; funding acquisition, BB. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement

A waiver of consent was issued by the Medical Ethical Committee of the Leiden University Medical Center. This study did not apply to the Medical Research Involving Human Subjects Act (N19.024).[11,13]

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

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Conflicts of Interest

The authors report no conflicts of interest in this work.

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Appendix. Topic List

- What does CRE mean for you?
- What are your experiences with CRE (positive and negative)?
- Which subjects should be part of a CRE?
- Additional topics to discuss in relation to CRE:
  - Therapy intensity
  - Task-oriented exercise
  - Group training
  - Patient-regulated exercise
  - Learning styles and approach
  - Goal setting
  - Team dynamics (multidisciplinary, interdisciplinary)
  - Technologies
  - Enriched environment
  - Informal caregiver participation
  - Diagnoses
  - Measurement instruments
  - Naming

Supplemental table

Supplemental table 1 COREQ (Consolidated criteria for Reporting Qualitative research) Checklist

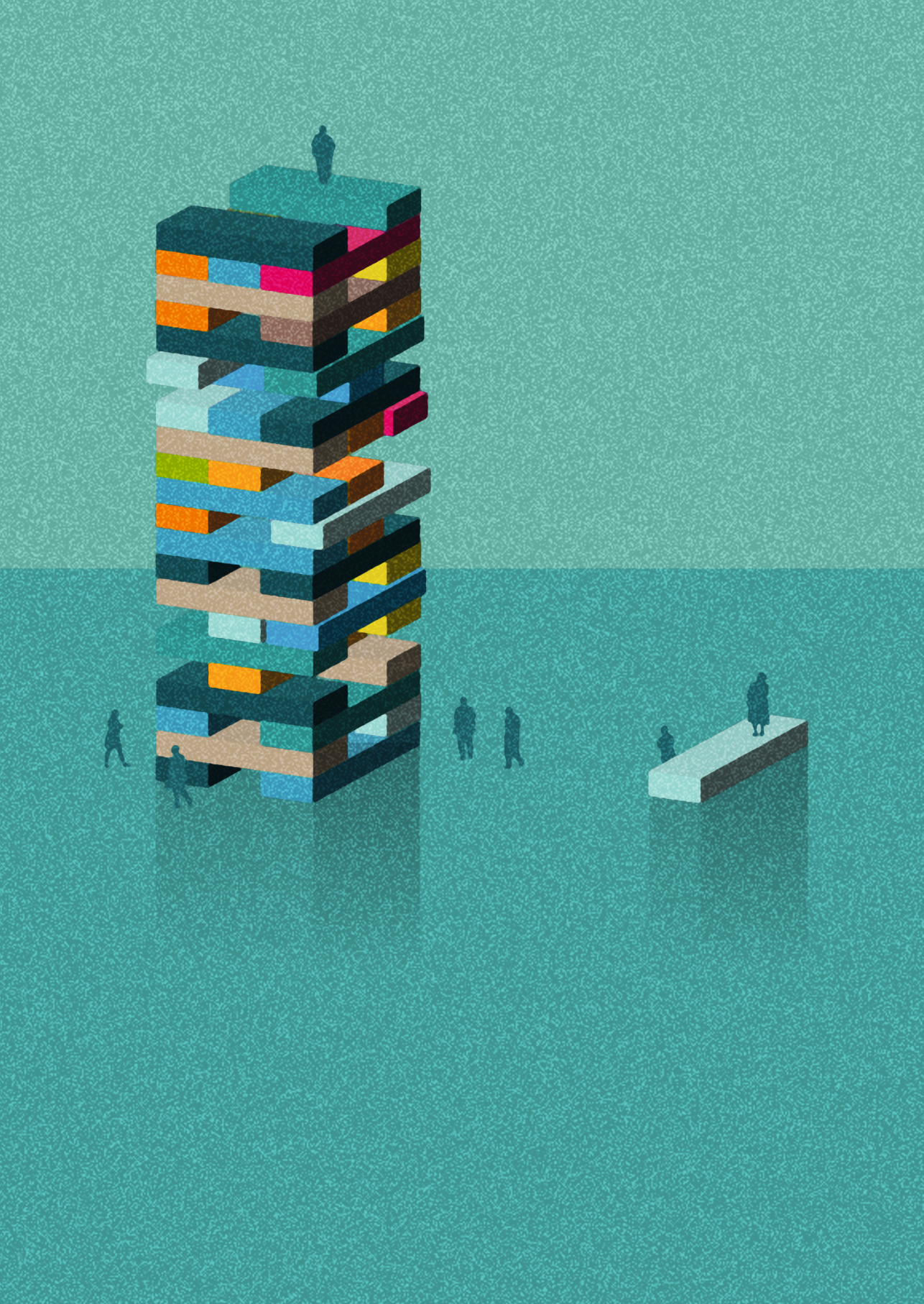
Topic	Item No.	Guide Questions/Description	Reported in chapter
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	Focus groups and Workshops
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	Focus groups
Occupation	3	What was their occupation at the time of the study?	Focus groups
Gender	4	Was the researcher male or female?	Focus groups
Experience and training	5	What experience or training did the researcher have?	Focus groups
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	Focus groups and workshops
Participant knowledge of the interviewer	7	What did the participants know about the researcher? E.g., personal goals, reasons for doing the research	Focus groups
Interviewer characteristics	8	What characteristics were reported about the interviewer/facilitator? E.g., bias, assumptions, reasons and interests in the research topic	Focus groups
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? E.g., grounded theory, discourse analysis, ethnography, phenomenology, content analysis	Study design

Supplemental table 1 COREQ (Consolidated criteria for Reporting Qualitative research) Checklist *(continued)*

Topic	Item No.	Guide Questions/Description	Reported in chapter
Participant selection			
Sampling	10	How were participants selected? E.g., purposive, convenience, consecutive, snowball	Recruitment of participants
Method of approach	11	How were participants approached? E.g., face-to-face, telephone, mail, email	Recruitment of participants
Sample size	12	How many participants were in the study?	Participants
Non-participation	13	How many people refused to participate or dropped out? Reasons?	Participants
Setting			
Setting of data collection	14	Where was the data collected? E.g., home, clinic, workplace	Focus groups and workshops
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	Focus groups
Description of sample	16	What are the important characteristics of the sample? E.g., demographic data, date	Table 1
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Focus groups Appendix 1
Repeat interviews	18	Were repeat interviews carried out? If yes, how many?	Participants
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	Focus groups and workshops
Field notes	20	Were field notes made during and/or after the interview or focus group?	Focus groups
Duration	21	What was the duration of the interviews or focus group?	Focus groups and workshops

Supplemental table 1 COREQ (Consolidated criteria for Reporting Qualitative research) Checklist *(continued)*

Topic	Item No.	Guide Questions/Description	Reported in chapter
Data saturation	22	Was data saturation discussed?	Recruitment of participants
Transcripts returned	23	Were transcripts returned to participants for comment and/or correction?	Focus groups
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	Data analysis
Description of the coding tree	25	Did authors provide a description of the coding tree?	Data analysis
Derivation of themes	26	Were themes identified in advance or derived from the data?	Data analysis
Software	27	What software, if applicable, was used to manage the data?	Data analysis
Participant checking	28	Did participants provide feedback on the findings?	Focus groups
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/ findings? Was each quotation identified? E.g., participant number	Results
Data and findings consistent	30	Was there consistency between the data presented and the findings?	Results Table 2 and 3
Clarity of major themes	31	Were major themes clearly presented in the findings?	Results Table 2 and 3
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	Results Table 2 and 3



Chapter 5

The conceptualization of a Challenging Rehabilitation Environment in geriatric rehabilitation: results of a concept mapping study.

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Submitted

Abstract

Objectives: A challenging rehabilitation environment (CRE) is a relatively new concept for offering geriatric rehabilitation (GR) and consists of multiple components. To date, there is no evidence-based conceptualization of CRE.
Design: Concept mapping study
Setting and participants: A total of 20 (para)medical staff, 11 nursing staff, and 15 rehabilitants and informal caregivers participated, all working or currently rehabilitating in GR.
Methods: Statements regarding CRE were extracted from previous studies on CRE. Participants rated these statements according to importance for CRE and subsequently clustered all statements in a maximum of 10 clusters. The statistical procedure of concept mapping was performed in computer program Ariadne 3.0 and consisted of a multi-dimensional scaling procedure and a hierarchical cluster analysis. The multi-dimensional scaling procedure led to a point map showing the extent to which the statements are related according to all participants. The hierarchical cluster analysis subsequently led to a cluster solution which represents the concept of CRE.
Results: A total of 70 statements were formulated to describe the concept of CRE. The statistical procedure resulted in five clusters: 1) goals (how they are formulated and guide the rehabilitation process), 2) rehabilitant and informal caregiver (factors concerning coping process, resilience and involvement in the rehabilitation process), 3) staff aspects (interdisciplinary collaboration and integrating rehabilitation in all daily activities), 4) environmental aspects (the design of the ward should be stimulating and challenging), and 5) exercise and peer support (how are exercise moments and peer support stimulated).
Conclusions and implications: This study gives an evidence-based conceptualization of CRE, based on statistical consensus of three relevant stakeholder groups in the practice of GR. This conceptualization provides a basis for rehabilitation wards to organize their GR.

Keywords

Geriatric rehabilitation, challenging rehabilitation environment, concept mapping, post-acute care

Introduction

Geriatric Rehabilitation (GR) was recently defined as "a multidimensional approach of diagnostic and therapeutic interventions, the purpose of which is to optimize functional capacity, promote activity and preserve functional reserve and social participation in older people with disabling impairments."[1] With the ageing of the population, the demand for GR in Europe has increased.[2,3] In the Netherlands, for example, 54,910 persons were referred to GR in 2021.[4]

In a Challenging Rehabilitation Environment (CRE), GR is offered in a multidimensional and structured approach. It is, however, a relatively new concept.[5-8] To date, there is no official definition of CRE and there are considerable differences between rehabilitation wards in their interpretation and execution of CRE. Despite these differences, professionals who work in a CRE assume CRE to be an effective and efficient way to offer GR and to stimulate rehabilitants to actively participate in their rehabilitation process.[7]

The aim of the CREATE study (Challenging REhAbiliTation Environment) is to develop an evidence-based conceptualization of CRE and to study empirical evidence for the added value of CRE for rehabilitants.[9] In prior studies, i.e., a narrative review and two qualitative studies regarding the perspectives of professionals, rehabilitants and informal caregivers, components for the conceptualization of a CRE were identified. Identified components included the manner in which therapy is offered, the involvement of informal caregivers, nutrition, eHealth, environmental aspects and staff aspects.[6-8]

The aim of the present study is to generate consensus among stakeholders and to assemble these components into an evidence-based conceptualization of CRE using the Concept Mapping method. This method was specifically developed to combine evidence-based knowledge with the collective judgement of stakeholders. We used advanced statistical methods to construct an evidence-based concept.[10,11]

Method

Study design

Concept mapping is a highly structured procedure which combines sorting techniques with multi-dimensional scaling and cluster analyses. It was developed by Trochim and is used as an exploratory consensus procedure for modelling conceptual frameworks based on specific elements and the input of relevant stakeholders.[10,11] The combination of evidence-based, expert-based and experience-based knowledge in combination with advanced statistical analyses contributes to the richness of the conceptualization of CRE.

Development of statements

The results of the previous review and qualitative studies on CRE were used as a basis for the statement development for the concept mapping.[6-8] To optimize the content validity of the statements, two steps were taken. First, the research group assessed the results of the previous studies for topics. Second, the list of topics was reviewed, and corresponding statements were refined in multiple rounds by the research group until consensus was reached on wording and content of the statements.

Recruitment of participants

In a CRE, there are three important groups of stakeholders, i.e., 1) nursing staff, 2) (para)medical staff, and 3) rehabilitants and informal caregivers.[6-8] Participants for this study were therefore recruited from these three groups.

Persons in GR are trying to adapt to and self-manage their current condition. In line with the ideas of Huber et al. on positive health, the term 'rehabilitants' is more appropriate for these persons than the term 'patients' and will be used in this article.[12]

Five GR wards in the Netherlands were requested to inform their current rehabilitants and informal caregivers about this study via a leaflet, and to invite them to participate individually in this study. If rehabilitants and/or their caregivers were interested, they were put in contact with the primary researcher (LT). Potential questions of rehabilitants and informal caregivers were answered by LT during

a visit to the ward, and an informed consent form was signed by the participant and LT.

Dutch professionals who were invited for the focus groups of the previous qualitative study were asked to participate in the concept mapping procedure. The selection procedure for these participants is described elsewhere.[7] To achieve a sufficient number of professionals, additional participants were invited via the five above-mentioned GR wards.

During the recruitment phase, from November 2021 to June 2022, we aimed to obtain input from different professional disciplines in the broad field of rehabilitation, e.g. medical doctors, physical therapists, occupational therapists, psychologists, speech and language therapist, and nurses.

The selected professionals were invited by email to participate. Participants who did not respond to the first invitation were sent reminders after 2 weeks and after 6 weeks.

We aimed for a sufficient mix of participants, i.e., 20 rehabilitants and informal caregivers, 20 nursing staff and 20 (para)medical staff, in order to give all relevant parties equal input in the analysis and the final conceptualization of CRE. The inclusion of participants continued until interim correlation analyses showed that a stable concept map was achieved.

Concept mapping

Included professionals were sent a link for participation. Rehabilitants and informal caregivers who were able to participate digitally were also sent a link to participate. Professionals, rehabilitants, or informal caregivers who were unable to participate digitally were visited by LT. They were given paper cards with the statements, and LT transported their results to the digital application Ariadne 3.0 in which the data were stored.[13]

Participants were asked to rate the statements according to importance for CRE on a five-point scale (1=least important, 5=most important). An equal distribution of 14 statements per assessment category was aimed for. After rating the

statements, participants were asked to cluster all statements in a maximum of 10 clusters and to name the clusters. No maximum number of statements per cluster was set. Only data from participants who completed both tasks were included in the analysis.

For the concept mapping procedure, the computer program Ariadne, version 3.0 was used. This program contains an algorithm which uses the statistical procedure of concept mapping to generate a conceptual framework. The statistical procedure consists of a multi-dimensional scaling procedure and hierarchical cluster analysis.[13] This systematic approach and the statistical analyses contributed to the replicability and a high internal validity of the conceptual framework CRE.[10,14] Reviews show that concept mapping has been successfully applied to combine these statistical procedures for the analysis of the structure of meaning of statements.[15,16]

In the first step, the mean rating and standard deviation were calculated for all statements. In the second step, a multi-dimensional scaling procedure resulted in a point map, a two-dimensional map on which all statements are positioned. The distance between the statements on the point map shows to what extent the statements are related. During data collection, this step was repeated until no modifications occurred in the point map. This indicated that the point map was stable and inclusion of participants stopped.

In the third step, a hierarchical cluster analysis was performed using the coordinates of the point map. Several cluster maps were reviewed by the research group, resulting in a cluster solution representing the concept of CRE.[11]

Following the methodology, the last step consisted of a thorough study of the content of the clusters by the research group. This led to minor adjustments of the clusters. Furthermore, the clusters were labelled and described, using the input from the participants from the clustering assignment.

Ethical approval

The Medical Ethical Committee of the Leiden University Medical Centre has assessed the study protocol for this study and concluded that the Medical Research

Involving Human Subjects Act does not apply to this research project and has therefore issued a waiver of consent (N19.024).

Results

An assessment of the results of the previous studies on CRE resulted in 141 topics regarding CRE.[6-8] The research group reviewed and refined these topics into 70 statements until consensus was reached. During this review process, topics with similar content were combined in one statement and topics with multiple content were split into multiple statements.

Participants

A total of 71 potential participants were approached to participate in the study (33 (para)medical staff, 30 nursing staff, 18 rehabilitants and informal caregivers). Forty-six participants completed both the rating and the clustering task (Table 1): 20 (para)medical staff (60.6%), 11 nursing staff (36.7%), 15 rehabilitants and informal caregivers (83.3%).

After inclusion of the data from these 46 participants, the concept map showed a stable outcome on the correlation analysis. Therefore, data saturation was reached and recruitment of participants ended.

Non-responders

Two professionals reported having insufficient overview of the concept CRE, four professionals had problems with the digital application and did not respond when offered a face-to-face appointment. One rehabilitant experienced the cognitive load of the clustering task as too high. Two informal caregivers had difficulties with the digital application and were unable to make a face-to-face appointment.

Table 1. Characteristics of participants

		(para) medical staff (n=20)	Nursing staff (n=11)	Rehabilitants and informal caregivers (n=15)
Age (median (IQR*))		41 (34-51)	31 (26-51)	77 (72-85)
Female (n (%))		14 (70)	11 (100)	14 (93.3)
Function (n (%))	Occupational therapist	5 (25)		
	Psychologist	1 (5)		
	Nurse practitioner	1 (5)		
	Speech and language therapist	2 (10)		
	Physical therapist	7 (35)		
	Rehabilitation physician	1 (5)		
	Elderly care physician	3 (15)		
	Nurse		10 (90.9)	
	Nurse student		1 (9.1)	
	Rehabilitant			13 (86.7)
	Informal caregiver			2 (13.3)
Diagnosis (n (%))	Trauma			8 (53.3)
	Stroke			4 (26.7)
	Post covid			2 (13.3)
	Urosepsis			1 (6.7)
Years of experience (median (IQR*))		14 (6-23)	4 (2-5)	

*IQR = interquartile range

Concept map

Clustering

The first step of the analysis resulted in a point map. In this point map the majority of the statements was positioned on the north, south-east and south-west section of the map (Figure 1). The second step of the analysis, the hierarchical cluster analysis, resulted in a cluster solution with five large clusters, one cluster of two statements (statements 8 and 9) and two individual statements (statements 32 and 57).

Each of the five larger clusters had their own specific topic. The first cluster contained four closely clustered statements, focusing on the goal setting process and how goals are used as a guide during the rehabilitation trajectory. The second cluster contained 11 relatively closely clustered statements. These statements all focused on factors concerning the rehabilitant and the informal caregiver. The third cluster comprised 15 statements. Ten of these statements were closely clustered and five statements were more scattered. The statements in this cluster mainly concern the interdisciplinary collaboration in the rehabilitation team. The fourth cluster was very closely clustered and contained 20 statements, all focusing on the design of the rehabilitation ward. The fifth cluster was relatively scattered and contained 16 statements focusing on how exercises are offered and on peer support.

The two statements in the smaller cluster of two concerned peer support during mealtime and using eHealth during exercises, and they were positioned close to cluster 5. The two individual statements concerned clustering of diagnosis groups (32) and identifying persons as rehabilitants instead of patients (57). Statement 32 was positioned just south of cluster 5 and statement 57 just east of cluster 3.

Based on the content of the clusters and the position of the statements on the point map, we performed adjustments in the cluster solution, which then resulted in five clusters to describe the concept of a CRE.

Statements 8, 9 and 32 were added to cluster 5 and statement 57 was added to cluster 3 (Figure 1).

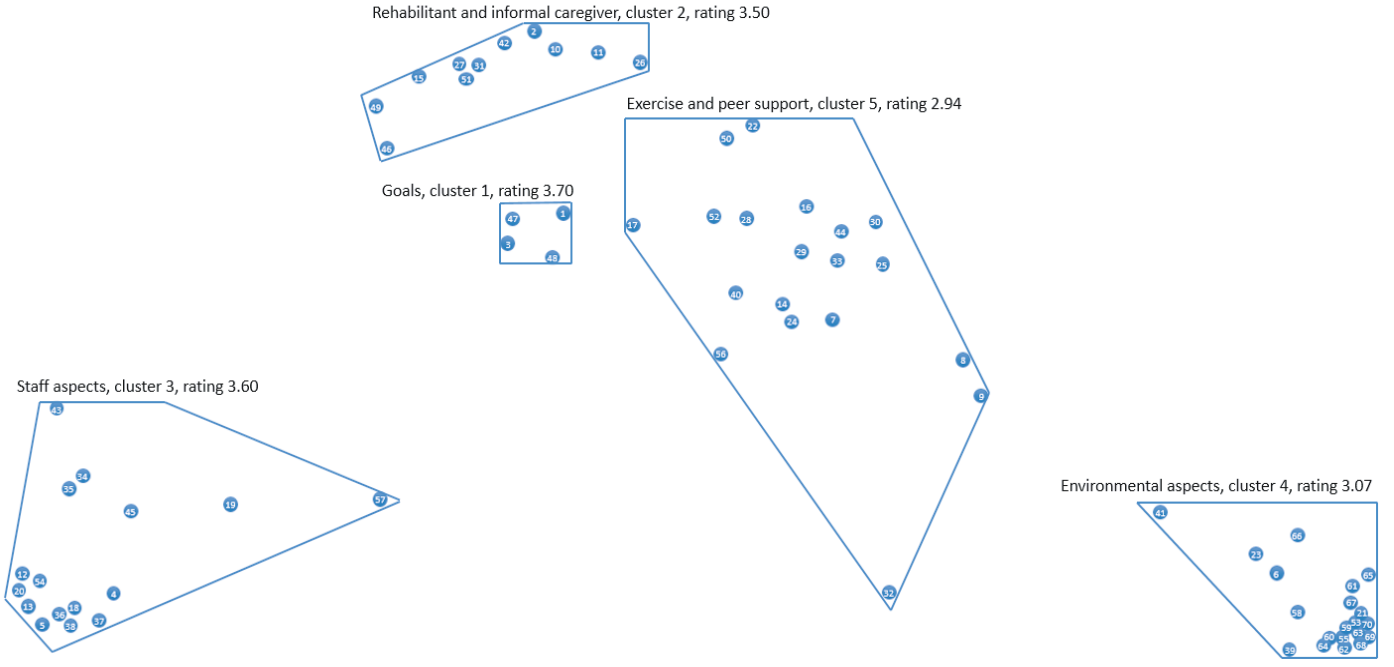

Figure 1. Cluster map

The research group discussed the five clusters and labelled them as follows: (1) goals (how are the goals for the rehabilitation formulated and how do they guide the rehabilitation process), (2) rehabilitant and informal caregiver (factors concerning the coping process, resilience and the involvement of the rehabilitant and informal caregiver in the rehabilitation process), (3) staff aspects (focusing on interdisciplinary collaboration in the rehabilitation team and all team members being focused on rehabilitation during daily activities), (4) environmental aspects (the design of the rehabilitation ward should stimulate and challenge rehabilitants), and (5) exercise and peer support (how do rehabilitants exercise during their rehabilitation and factors concerning peer support).

The five clusters and their statements are described in Table 2.

Table 2. Cluster description and their statements.

Number	Statement	Mean rating (SD*)
Cluster 1	*Goals*	*3.69 (1.12)*
3	The goals of the rehabilitant guide the use of therapies and the duration of admission.	3.87 (1.07
47	The rehabilitation plan includes goals, evaluations, exercises, and the discharge process.	3.87 (1.00)
48	The rehabilitation goals cover both the inpatient period and rehabilitation at home.	3.53 (1.39)
1	Home visits are an integral part of rehabilitation.	3.52 (1.19)
Cluster description	This cluster concentrates on the goals for rehabilitation. How they are formulated and how they guide the rehabilitation process.	
Cluster 2	*Rehabilitant and informal caregiver*	*3.48 (1.18)*
2	The rehabilitant and informal caregivers are prepared for the fact that rehabilitation does not stop after discharge.	4.02 (1.07)
51	The rehabilitation plan is formulated and adjusted in consultation with the rehabilitant and informal caregiver.	3.98 (1.05)
42	Informal caregivers are educated about skills needed during and after rehabilitation.	3.93 (1.09)
31	The medical condition is explained to the rehabilitant and informal caregiver.	3.85 (0.93)
15	The rehabilitant and informal caregiver are part of the rehabilitation team.	3.76 (1.20)

Table 2. Cluster description and their statements. *(continued)*

Number	Statement	Mean rating (SD*)
49	The team teaches the rehabilitant and informal caregiver how to deal with cognitive problems.	3.67 (1.02)
46	The team teaches the rehabilitant and informal caregiver how to manage stimuli and resilience.	3.35 (1.08)
10	Attention is given to the informal caregiver's resilience, change of role, and grieving process.	3.17 (1.24)
27	The rehabilitant and the informal caregiver participate in the multidisciplinary consultation.	3.16 (1.24)
11	Rehabilitant and informal caregiver have access to and contribute to the reports.	2.91 (1.42)
26	Informal caregivers are welcome on the rehabilitation unit throughout the day.	2.72 (1.39)
Cluster description	This cluster's focus is on factors concerning the rehabilitant and informal caregiver. The statements mention the coping process, the resilience and the involvement of rehabilitant and informal caregivers in the rehabilitation process.	
Cluster 3	*Staff aspects*	*3.59 (1.24)*
45	The team encourages the self-reliance and independence of the rehabilitant.	4.41 (0.96)
4	Nurses have a treatment role and they practice daily tasks with rehabilitants during daily care.	4.22 (0.95)
54	The team apply interdisciplinary working method and is jointly responsible for achieving goals.	4.20 (1.07)
13	Employees are flexible, interested, empathetic, active, encouraging, and motivating.	4.17 (1.04)
36	The rehabilitation team and management have a shared vision of geriatric rehabilitation.	4.02 (1.15)
35	The rehabilitation team takes into account the learning style of the rehabilitant.	3.78 (1.06)
37	All disciplines are equal and there is no hierarchy.	3.76 (1.33)
12	The team encourages rehabilitants in an unambiguous manner.	3.73 (1.03)
5	Employees deliberately chose to work in a rehabilitation unit.	3.65 (1.29)
20	Staff work in accordance with current scientific knowledge on geriatrics and rehabilitation.	3.40 (1.16)
34	The rehabilitation team also focus on a meaningful life after rehabilitation.	3.40 (1.26)

Table 2. Cluster description and their statements. *(continued)*

Number	Statement	Mean rating (SD*)
38	Staff encourage a positive atmosphere on the ward and contact between rehabilitants	3.38 (1.22)
43	The team offer information in different ways and at multiple moments.	3.24 (1.25)
18	A project leader or project group implements and secures the challenging rehabilitation environment in manageable steps.	3.02 (1.35)
19	Practitioners are present outside office hours if this is consistent with the rehabilitant's goals.	2.84 (1.33)
57	Patients are referred to as rehabilitants, not patients	2.44 (1.54)
Cluster description	This cluster concentrates on interdisciplinary collaboration in the rehabilitation team. All team members should be focused on rehabilitation during daily activities, which is shown in their attitude.	
Cluster 4	*Environmental aspects*	*3.04 (1.29)*
63	The layout of the ward is challenging and provides safety to practice independently.	3.98 (1.09)
65	Exercise materials and ADL aids are available on the ward.	3.93 (1.17)
66	Rehabilitants can use exercise facilities and exercise room throughout the day.	3.89 (1.11)
41	The food is tasty, healthy and (protein) enriched, prepared with readily available products.	3.55 (1.12)
53	Relevant rooms are within walking distance and handrails are provided in the hallways.	3.46 (1.31)
68	Low-stimulus rooms and resting opportunities are available on the ward.	3.35 (1.27)
67	On the ward it is possible to practice on different surfaces and to practice stair climbing.	3.27 (1.19)
55	The bedroom has a seating area that challenges the rehabilitant to get out of bed.	3.24 (1.27)
64	Exercise rooms of the treatment disciplines are integrated in the ward and clearly visible.	3.13 (1.12)
69	There is a common room on the ward for rehabilitants to stay and exercise.	3.04 (1.28)
61	Landmarks/reference points/anchor points/ help the rehabilitant orientate in time and place.	3.02 (1.07)
70	Games, computers, newspapers and television are available on the ward to relax.	2.95 (1.24)

Table 2. Cluster description and their statements. *(continued)*

Number	Statement	Mean rating (SD*)
59	The rehabilitant has a single bedroom with a private bathroom.	2.85 (1.46)
58	Treatment takes place on the ward whenever possible.	2.76 (1.36)
23	Rehabilitation takes place close to the rehabilitant's place of residence.	2.72 (1.47)
62	The exercise rooms offer the opportunity to create privacy for the rehabilitant	2.67 (1.24)
21	The layout of the ward matches the layout of the rehabilitant's home setting.	2.56 (1.33)
6	Rehabilitation is at a location near social activities.	2.50 (1.31)
60	The rehabilitation ward is small in size and serves a limited number of rehabilitants.	2.35 (1.36)
39	The rehabilitation ward is in a building for rehabilitation without long-term stay.	2.15 (1.17)
Cluster description	The focus of this cluster is on the design of the rehabilitation ward, which should stimulate and challenge rehabilitants. Statements focus on how the ward should be designed and which aids are needed.	
Cluster 5	*Exercise and peer support*	*2.92 (1.21)*
33	Independent exercises focus on mobility and activities of daily living.	3.89 (1.11)
29	Independent exercises should also be suitable to be performed in the home setting.	3.67 (1.26)
56	Daily therapeutic activity occurs via task-oriented training, performed as it would be at home.	3.43 (1.24)
25	Eating (preparing meals) is a practice moment that is in line with individual goals.	3.19 (1.23)
16	Group therapy focuses on goals related to mobility and activities of daily living.	3.18 (1.22)
40	Therapy moments match the rhythm and capacity of the rehabilitant, without fixed planning.	3.18 (1.16)
44	The rehabilitant receives challenging homework assignments that are evaluated.	3.18 (1.02)
28	Rehabilitants learn, encourage and support each other by means of peer contact.	3.09 (1.13)
14	Rehabilitants are encouraged to go outside on their own.	2.91 (1.25)
17	Post-discharge therapies are facilitated, if possible by the same practitioners	2.89 (1.33)

Table 2. Cluster description and their statements. *(continued)*

Number	Statement	Mean rating (SD*)
52	Group therapy focuses on coping with grief, cognition and communication.	2.82 (1.29)
32	Diagnosis groups are clustered as much as possible, for example stroke, trauma, etc.	2.75 (1.24)
8	eHealth applications make exercise fun and challenging	2.74 (1.21)
7	Rehabilitants can receive additional therapy moments from the therapists during walk-in hours.	2.67 (1.20)
22	Visitors who have no informal care responsibilities must observe visiting hours.	2.65 (1.53)
50	Rehabilitants work independently on improving communication, cognition and coping with grief.	2.65 (1.25)
24	eHealth monitors and clarifies changes in functioning.	2.49 (1.03)
9	The rehabilitants have meals together.	2.44 (1.36)
30	Rehabilitants learn new skills such as using technology.	2.04 (1.15)
Cluster description	This cluster concentrates on the way rehabilitants exercise during their rehabilitation. Statements related to promoting peer support are also part of this cluster.	

*SD = Standard deviation

Rating

Participants rated the 70 statements on a scale of 1 to 5. This resulted in a mean rating for the statements between 2.04 and 4.41 and a standard deviation of 0.95 to 1.54. Table 2 shows the results of the concept mapping, including the statements per cluster, and the rating and standard deviation per cluster and per statement.

Some statements in cluster 5 have a high rating, but the total cluster rating is the lowest of all clusters. Statement 45 about stimulating self-reliance and independence has the highest score (mean 4.41, standard deviation 0.96). The mean rating of the clusters varies between 2.92 and 3.69.

The subgroup analysis of the data showed an almost comparable division into clusters with a minimal difference in mean rating per cluster varying from 2.74

to 3.84 (Table 3). The range of the mean rating of the rehabilitants and informal caregivers is narrower than that of the other stakeholders.

Differences between the professionals and the rehabilitants / informal caregivers at the level of the statements are shown in Table 4. The ranking of the two professional subgroups is in line with the overall ranking of the statements, the ranking of the rehabilitants / informal caregivers shows differences resulting in a different top 10 of the statements.

Table 3. Cluster rating in total and per subgroup (mean, standard deviation).

	Total	(para)medical staff	Nursing staff	Rehabilitants and informal caregivers
Goals	3.69 (1.12)	3.84 (1.13)	3.48 (1.09)	3.65 (1.14)
Rehabilitant and informal caregiver	3.48 (1.18)	3.45 (1.21)	3.60 (1.14)	3.43 (1.17)
Staff aspects	3.59 (1.24)	3.63 (1.26)	3.82 (1.21)	3.37 (1.22)
Environmental aspects	3.04 (1.29)	2.80 (1.25)	3.01 (1.32)	3.39 (1.31)
Exercise and peer support	2.92 (1.21)	2.82 (1.23)	2.74 (1.13)	3.20 (1.24)

Table 4. Ranking of top 10 statements and mean rating

Statement	Total		(para)medical staff		Nursing staff		Rehabilitants and informal caregivers	
	Rank	Mean rating	Rank	Mean rating	Rank	Mean rating	Rank	Mean rating
45 The team encourages the self-reliance and independence of the rehabilitant.	1	4.41	1	4.75	1	4.82	19	3.67
4 Care workers have a treatment role and they practice daily tasks with rehabilitants during daily care.	2	4.22	5	4.30	2	4.73	2	3.93
54 The team apply interdisciplinary working method and is jointly responsible for achieving goals.	3	4.20	7	4.20	5	4.45	1	4.00
13 Employees are flexible, interested, empathetic, active, encouraging, and motivating.	4	4.17	2	4.50	8	4.18	13	3.73
2 The rehabilitant and informal caregivers are prepared for the fact that rehabilitation does not stop after discharge.	5	4.02	9	4.05	9	4.09	17	3.67
36 The rehabilitation team and management have a shared vision of geriatric rehabilitation	6	4.02	10	4.05	4	4.55	24	3.60
51 The rehabilitation plan is formulated and adjusted in consultation with the rehabilitant and informal caregiver.	7	3.98	3	4.40	20	3.73	25	3.60
63 The layout of the ward is challenging and provides safety to practice independently.	8	3.98	4	4.35	30	3.45	6	3.87
42 Informal caregivers are educated about skills needed during and after rehabilitation.	9	3.93	8	4.10	12	4.00	18	3.67
65 Exercise materials and ADL aids are available on the ward.	10	3.93	12	4.00	3	4.64	40	3.33

Discussion

In this study, relevant stakeholders in rehabilitation assembled the components of three previous studies on CRE into an evidence-based conceptualization of CRE using concept mapping.[6-8] This has led to a broadly supported conceptualization of CRE, which combines evidence-based, expert-based, and experience-based knowledge. One of the strengths of using concept mapping is that it combines the individual input of relevant stakeholders, without participants influencing each other.[10,11] The result is the conceptualization of CRE in five clusters: goals, rehabilitant and informal caregiver, staff aspects, environmental aspects, and exercise and peer support.

The complex intervention of a CRE was conceptualized with the input of relevant stakeholders. Involving relevant stakeholders from the start of the development of such an intervention is helpful for identifying needs and priorities and understanding the problem. This supports the implementation of evidence-based knowledge in practice.[17,18] The conceptualization achieved in this study describes all components relevant to a CRE. The involvement of the relevant stakeholders in this process results in a widely supported conceptualization. Implementing CRE according to the conceptualization achieved in this study may lead to broader support.

Although the subgroup analysis in this study resulted in an almost similar division into clusters, there were some differences between the stakeholders regarding the mean rating of the statements. First, the rehabilitants and informal caregivers ranked priority for the top 10 statements with the overall highest ranking statements very differently. Second, this subgroup's range in rating the clusters and statements was narrower than the professionals. These results show that the three stakeholder groups conceptualize CRE in a similar way, but that there are differences in the value they attach to the different aspects of CRE.

A recent scoping review by Lubbe et al. identified the rehabilitants' perspective on the quality of GR and confirmed differences between professionals and rehabilitants regarding their perspectives on GR.[19] Therefore, in order to create an optimal

CRE, it is important to look at the perspectives of all relevant stakeholders, while taking into account the interests of all stakeholders.

Remarkably, the statements on the use of eHealth and teaching rehabilitants new (technological) skills are rated relatively low in the current study (statements 8, 24 and 30, rating 2.04 to 2.74). Recent reviews have shown the benefits of integrating eHealth in GR, e.g., for improving physical activity, walking ability, and balance.[20-23] An international survey indicated barriers to the use of eHealth in GR, such as a lack of knowledge and a lack of an organization-wide implementation strategy. Also, healthcare professionals indicated that rehabilitants find eHealth complex to use.[24] These barriers could be an explanation for the low rating of these three statements in the current study. As it has proven benefits in GR, it is important that eHealth, regardless of the fact that it was rated low in this study, should be regarded as part of a CRE, now and in the future.

Strengths and limitations

Although the researchers tried to make the statements as accessible and easy to read as possible, some rehabilitants experienced challenges in understanding the statements. Therefore, a researcher was present at the moment rehabilitants participated in the study, and rehabilitants were able to ask for clarification. However, the decision of prioritizing and clustering was not influenced by the researcher.

Another limitation was that the Ariadne application did not work on tablets. Therefore, some participants had problems with entering the Ariadne application form. All participants were offered the possibility to carry out the assignment with paper cards, after which the researcher transported their data to the application. The research group does not expect this to have influenced the results of the current study.

One of the strengths of this study is that it is the first to combine the input from different stakeholders into a conceptualization of CRE. Even though the qualitative study about the perspectives of professionals on CRE included international participants, in this study the participants are all involved in geriatric rehabilitation in the Netherlands.[7] It might be interesting to repeat this study with international stakeholders in the field of GR.

The response rate for this study was 60.6% of the (para)medical staff, 36.7% of the nursing staff, and 83.3% of the rehabilitants and informal caregivers. The average response rate for studies utilizing data collected from individuals is 52.7% with a standard deviation of 20.4.[25] Only the response rate from the nursing staff is below average, but still within the limits of the standard deviation. The other stakeholder groups are above average. Therefore, the response rate for this study is considered good.

Conclusion and Implications

This study provides an evidence-based, expert-based, and experience-based conceptualization of CRE in five clusters: goals, rehabilitant and informal caregiver, staff aspects, environmental aspects, and exercise and peer support. These five clusters reflect the statistical consensus from three relevant and important groups of stakeholders in GR.

The clusters and statements that are created in this study provide a basis for rehabilitation wards regarding how to organize their geriatric rehabilitation and to discover their strengths and challenges. A self-evaluation tool developed out of this conceptualization might be useful for geriatric rehabilitation wards. It can help identify and visualize their strengths and areas for improvement.

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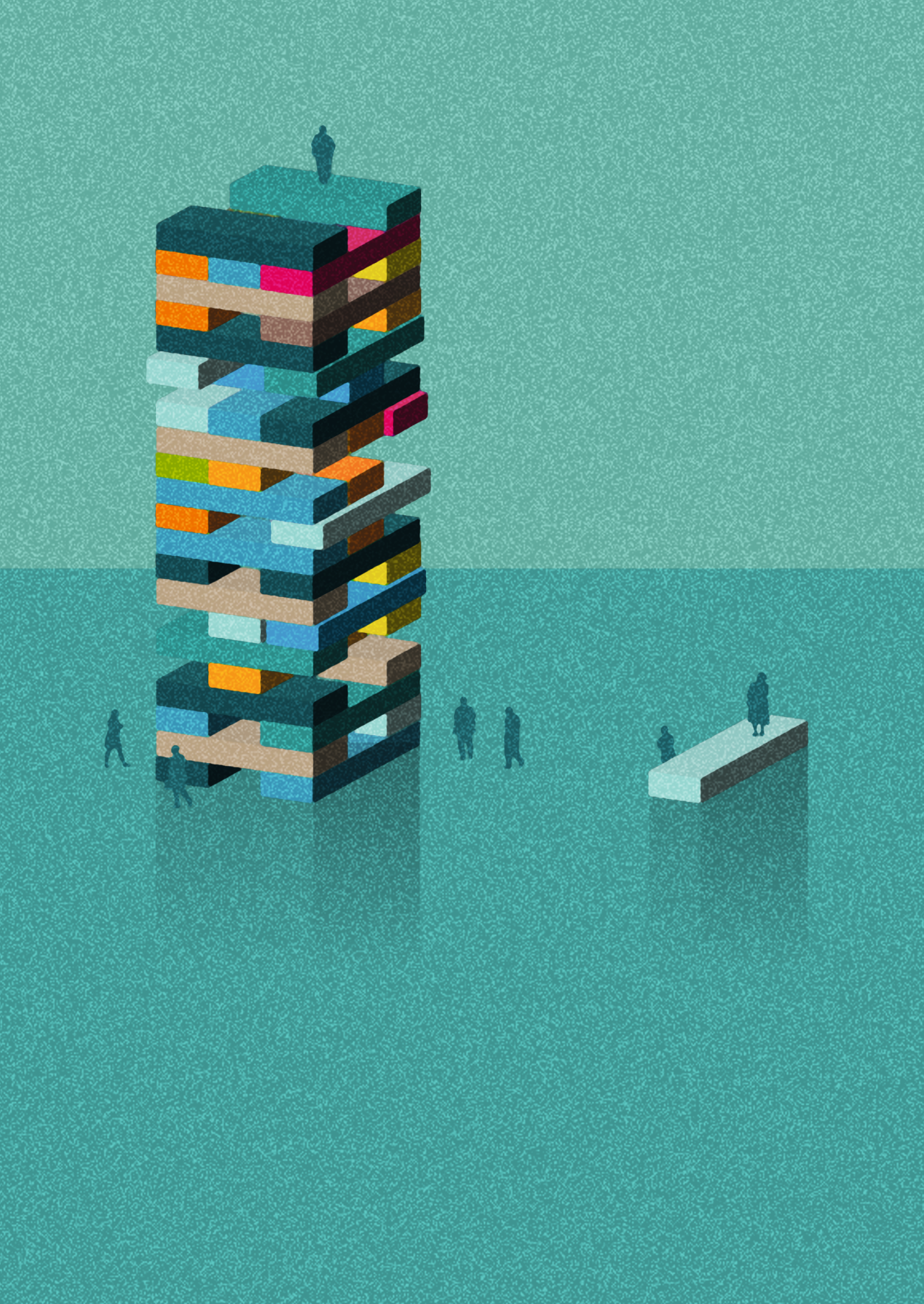

Chapter 6

The CREATE-tool: A self-evaluation tool for a Challenging Rehabilitation Environment in geriatric rehabilitation

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Submitted

Abstract

Objectives: A challenging rehabilitation environment (CRE) is a relatively new concept for offering geriatric rehabilitation and consists of multiple components. This study explores whether a self-evaluation tool (the CREATE-tool) can be applied in teams and can identify areas for improvement for wards regarding CRE.
Design: observational study
Setting and participants: 50 professionals working on 5 geriatric rehabilitation wards in the Netherlands participated; 28 (para)medical staff and 22 nursing staff.
Methods: The CREATE-tool with 70 statements in five clusters was developed based on previous studies. In the rating phase, participants were asked to score the statements of the CREATE-tool using the Plan, Do, Check, Act methodology. These scores were converted in individual and team standardized cluster ratings between 0 and 1 and visualized in a 5-axis radar chart. In the team discussion phase, a meeting was organized for each team, in which the results of the CREATE-tool were analysed and areas for improvement were identified. In the reporting phase, participants filled out an evaluation survey with 16 questions scored from 0 (lowest) to 10 (highest).
Results: The rating phase showed that the standardized cluster ratings of the five teams vary between 0.41 and 0.78 and that there are differences between team members in how they assess CRE on their ward. The team discussion phase consisted of lively discussions and resulted in 11 to 29 ideas for improvement per team. In the reporting phase, alle questions were answered with a median score of 7 or 8.
Conclusions and implications: The CREATE-tool, based on an evidence-based conceptualization of CRE, is successfully applied by professionals and helps to identify strengths and weaknesses of a ward. The CREATE-tool supports rehabilitation wards to improve their CRE, and therefore enhances the quality of geriatric rehabilitation.

Keywords

Geriatric rehabilitation, challenging rehabilitation environment, self-evaluation tool, CREATE-tool

Introduction

With the ageing of the population, the demand for Geriatric Rehabilitation is high. (1) For instance, in the Netherlands it has led to the referral of 54.910 persons in 2021, which represents 1.5% of the Dutch population over 65 years. (2, 3) In a recent consensus statement by Grund et al., geriatric rehabilitation is defined as "a multidimensional approach of diagnostic and therapeutic interventions, the purpose of which is to optimize functional capacity, promote activity and preserve functional reserve and social participation in older people with disabling impairments." (4) Despite this consensus definition there are international differences in the way geriatric rehabilitation is offered.

There is general agreement that rehabilitation should be offered in a multidimensional setting with a structured approach that stimulates and challenges the rehabilitant to actively work on their recovery. Such a Challenging Rehabilitation Environment (CRE) is seen as a promising method for delivering high quality rehabilitation. (5) Since there was no standard for CRE, considerable differences between wards in the implementation of CRE arose. The aim of the CREATE study (Challenging REhAbiliTation Environment) is to develop a conceptualization of CRE and to study empirical evidence for the added value of CRE for rehabilitants. (6) To date, the CREATE study has led to an evidence-based, expert-based and experience-based conceptualization of CRE in five clusters: goals, rehabilitant and informal caregiver, staff aspects, environmental aspects, and exercise and peer support. (6-10) This conceptualization was the basis for developing a self-evaluation tool for CRE ('the CREATE-tool'), which can help rehabilitation wards to improve CRE.

Self-evaluation is a powerful instrument that uses the knowledge and experience of the professionals to assess the level of compliance with a concept. Moreover, it generates feedback for the organization, ward or team. In the literature, self-evaluation or self-assessment is defined as: "a comprehensive, systematic and regular review of an organisation's activities and results. The self-evaluation process allows the organisation to discern clearly its strengths and areas in which improvements can be made. Also, improvement actions can be monitored for progress." (11-13)

The developed CREATE-tool is a logical first step towards the implementation of CRE. However, this approach is new and needs to be studied. The aim of the current study is to explore the feasibility of applying the CREATE-tool in a clinical setting by investigating the following research questions: 1) does the CREATE-tool identify areas for improvement for wards regarding CRE, and 2) how do the users evaluate the process of application of the CREATE-tool?

Method

Study design

This is an observational study. In the development of the CREATE-tool the results of previous studies concerning CRE were integrated. (7-10)

Setting and participants

Professionals of five wards of two geriatric rehabilitation providers in the Netherlands participated in this study. On each ward the team manager used purposive sampling to select 10 professionals from various disciplines to participate in this study in order to represent the interdisciplinary team.

Study protocol

After the development of the CREATE-tool, the protocol for this study consists of three phases: 1) rating phase, 2) team discussion phase, and 3) reporting phase.

Development of the CREATE-tool

The previous study on CRE resulted in a conceptualization of CRE in 5 clusters with a total of 70 statements. (7) The number of statements per cluster varied between 4 and 20. These statements were used to develop the CREATE-tool, and a short description was made for each statement. Each statement could be rated according to the Plan, Do, Check, Act (PDCA) methodology, in order to assess the current situation on the ward. (14-16) Also, a short description was made for all PDCA elements (Appendix 1). The PDCA rating was chosen because it represents the four steps for improvement. The four rating categories are meaningful and dynamic and facilitate a discussion about the context instead of the rating.

To convert the rating per statement into a cluster rating, all PDCA elements were treated as ordinal data, in which Plan represents a value of 1, Do a value of 2, Act a value of 3, and Check a value of 4. The standardized cluster rating is calculated as the sum of the actual ratings divided by the maximum obtainable score per cluster. Therefore, the standardized score varies between 0.25 and 1.00. This standardized score is shown in a 5-axis radar chart, of which each axis represents one cluster.

To combine the individual results in team results per ward, the median and range per statement were determined. The median ratings were used to calculate the standardized team cluster ratings, which were visualized in a 5-axis radar chart.

Rating phase

All participants were invited by email to individually fill in the CREATE-tool based on the current situation on their ward. They received a link to a form hosted by Castor Electronic Data Capture, a secure, cloud-based electronic data capture platform. (17) Participants received a reminder after two weeks if they had not completed the tool.

According to the protocol, the individual ratings in Castor were converted to Excel, in order to calculate the individual and team standardized scores for the five clusters. The scores were not used to study the psychometric properties of the CREATE-tool, but to visualize the ratings of the professionals and teams.

Team discussion phase

On each ward a team meeting of two hours was organized. At the start of the meeting, all participants received their individual results (PDCA rating and radar chart) and the team results (median and range PDCA and radar chart) concerning the CREATE-tool. The team meeting was chaired by a researcher (LT) who was in possession of all individual results and the team results.

During the team meeting the team members were invited to discuss the results for each consecutive cluster. Points of discussion could be: deviations between individual and team rating, team ratings which were considered debatable, state-

ments for which team members saw opportunities for improvement, and any ideas how to implement these improvements.

During the meeting, the chair noted the ideas for improvement on flip charts. After discussing all clusters, the participants were asked to prioritize the improvement ideas. Each participant was asked to indicate three quick wins and three ideas they thought were important but would take more time to implement.

The aim of the CREATE-tool is to initiate a discussion in the team that helps to identify areas for improvement. The purpose is not to reach homogeneity in the data. This phase is positive when it results in a lively team discussion in which several areas for improvement are identified.

Reporting phase

During the team meetings, researchers BB or ED made field notes.

To gain insight into how the application of the CREATE-tool is evaluated, all participants received an online survey by email after the team meetings, and a reminder after two weeks. This survey was also hosted by Castor EDC. (17) The evaluation survey consisted of 16 questions, to be answered using a visual analog scale ranging from zero to 10 in increments of 1 (zero being the worst and 10 being very good). The questions related to 1) the content of the CREATE-tool, 2) the entire process, and 3) the added value for their work.

Results

Participants

The data were collected in May and June 2023. A total of 50 participants, in five teams, were approached. All participated in at least one part of the study, 40 completed the CREATE-tool (80%), 40 participated in the team meetings (80%), and 38 completed the evaluation survey (76%). Six to 11 participants per team completed the CREATE-tool. Table 1 shows the characteristics of the participants.

Table 1. Characteristics of participants: number of participants per phase and number of professionals per occupation.

Participants	Self-evaluation tool	40
	Team meeting	40
	Evaluation survey	38
Occupation	Nurse	19
	Nutrition assistant	2
	Care mediation	1
	Occupational therapist	6
	Physical therapist	8
	Physician	3
	Nurse practitioner	1
	Psychologist	4
	Dietician	3
	Speech and language therapist	3

n = 50

Rating phase

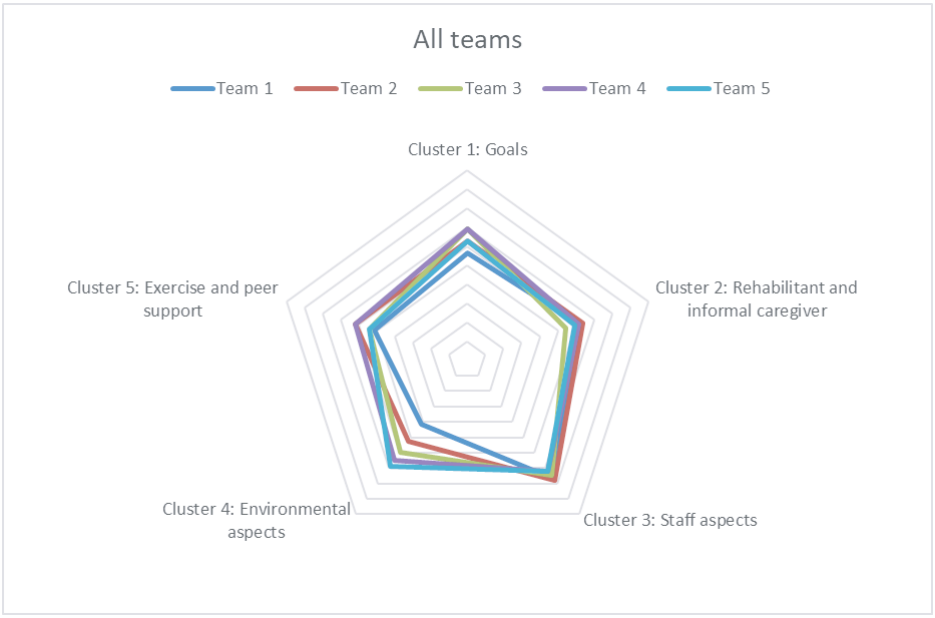
Table 2 and Figure 1 show the results of the five teams on the five clusters of the CREATE-tool. The standardized cluster ratings of the five teams on all clusters vary between 0.41 (team 1, cluster 4; environmental aspects) and 0.78 (team 2, cluster 3; staff aspects). The ratings of the five teams in cluster 4 have a variance between 0.41 and 0.69, while the team ratings in cluster 3 differ less (0.72 to 0.77). Furthermore, Figure 1 shows that there are differences between team members in how they assess the CRE. The complete CREATE-tool with the detailed results per statement per team can be found in Appendix 1.

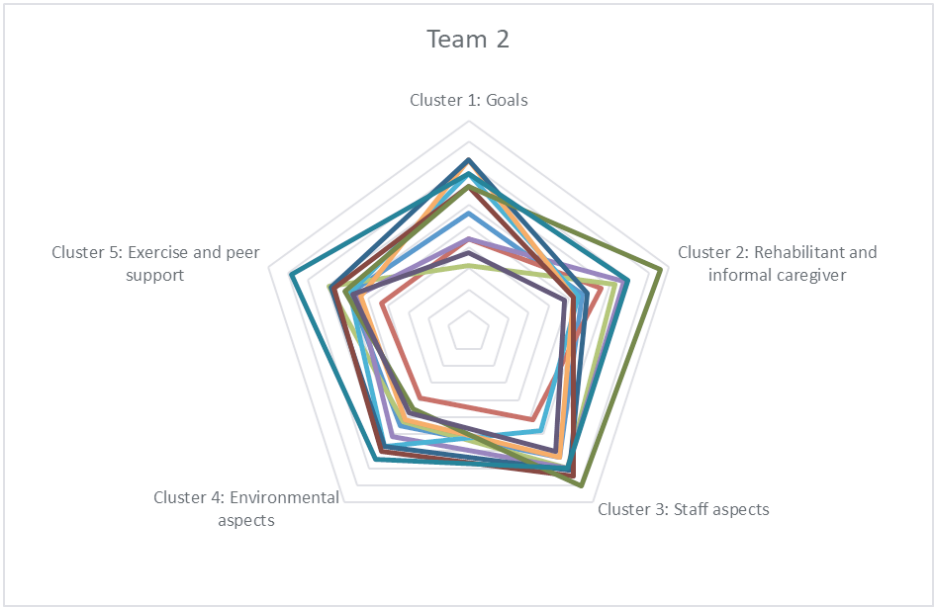
Table 2. Standardized cluster rating of the CREATE-tool per team per cluster

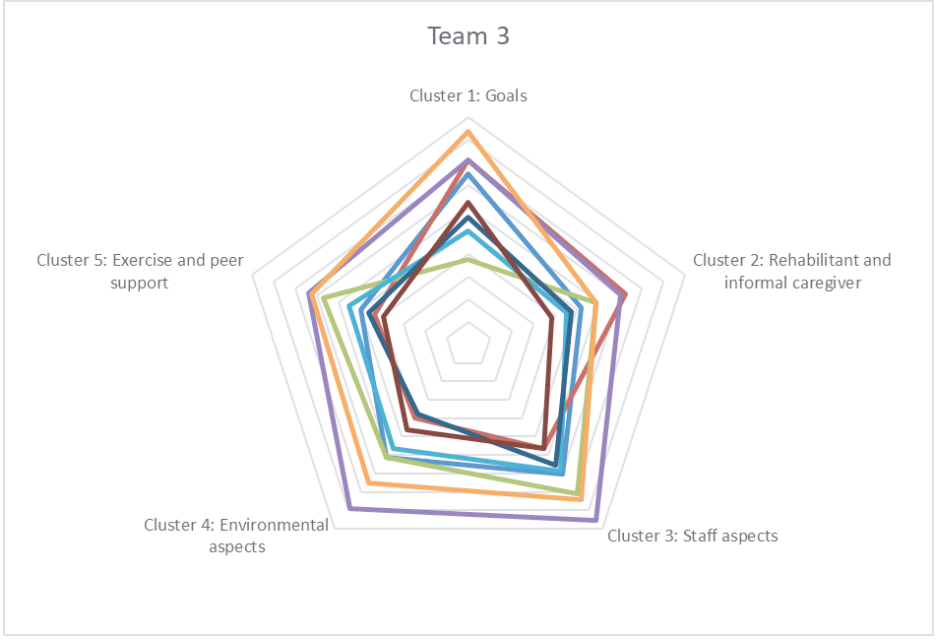
	Team 1	**Team 2**	**Team 3**	**Team 4**	**Team 5**
Cluster 1: Goals	0.56	0.63	0.69	0.69	0.63
Cluster 2: Rehabilitant and informal caregiver	0.61	0.64	0.55	0.61	0.59
Cluster 3: Staff aspects	0.77	0.78	0.75	0.72	0.72
Cluster 4: Environmental aspects	0.41	0.53	0.60	0.65	0.69
Cluster 5: Exercise and peer support	0.51	0.62	0.54	0.62	0.54

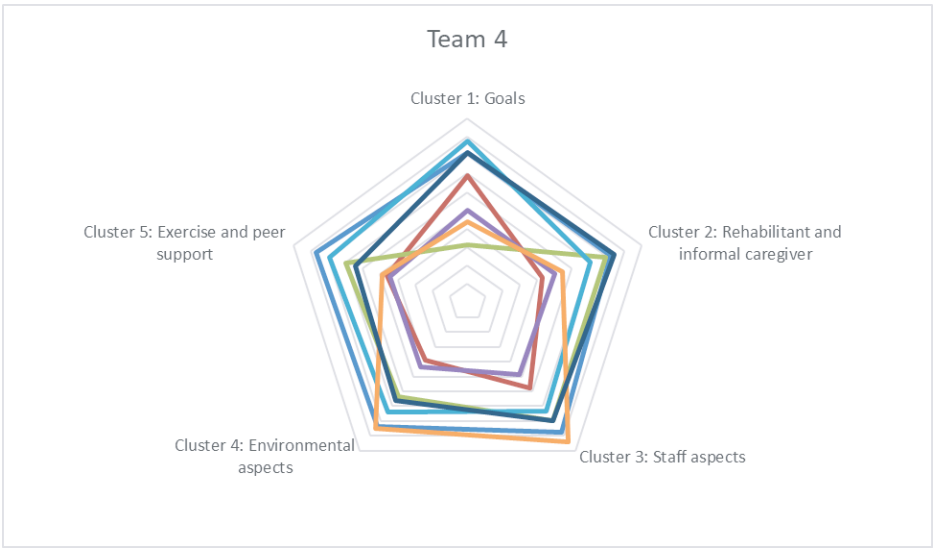
Standardized score range 0.25-1.00

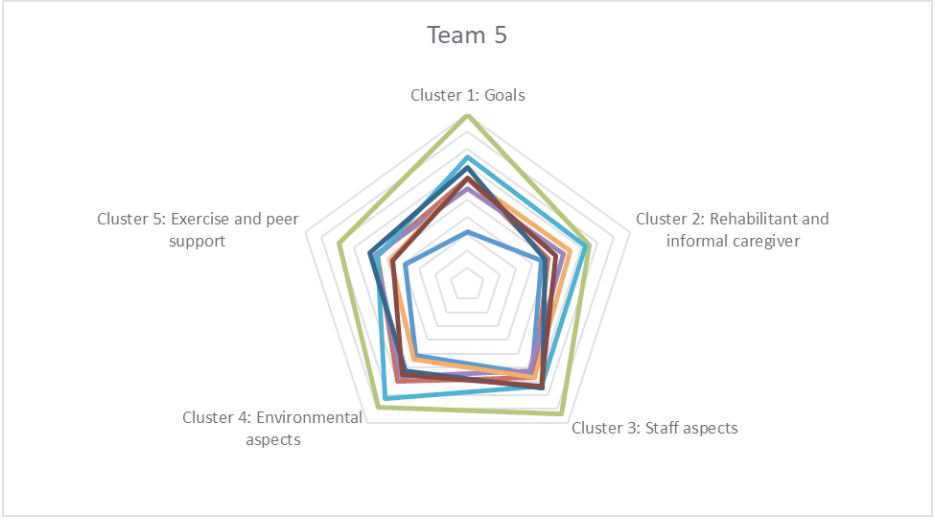
Figure 1. Radar chart CREATE-tool; standardized cluster rating per team or per participant




Team 2
Cluster 1: Goals
Cluster 2: Rehabilitant and informal caregiver
Cluster 3: Staff aspects
Cluster 4: Environmental aspects
Cluster 5: Exercise and peer support


Team 3
Cluster 1: Goals
Cluster 2: Rehabilitant and informal caregiver
Cluster 3: Staff aspects
Cluster 4: Environmental aspects
Cluster 5: Exercise and peer support


Team 4
Cluster 1: Goals
Cluster 2: Rehabilitant and informal caregiver
Cluster 3: Staff aspects
Cluster 4: Environmental aspects
Cluster 5: Exercise and peer support


Team 5
Cluster 1: Goals
Cluster 2: Rehabilitant and informal caregiver
Cluster 3: Staff aspects
Cluster 4: Environmental aspects
Cluster 5: Exercise and peer support

Appendix 1 shows that teams can have similar standardized cluster ratings, but different scores at the statement level. For instance, on cluster 5, exercise and peer support, teams 2 and 4 both score 0.62 on the cluster level and teams 3 and 5 both score 0.54. Teams 2 and 4, and teams 3 and 5 are comparable regarding this cluster, but on the item level all teams score differently.

Table 2 also shows that there is a wide range of answers on the statement level within one team.

Team discussion phase

During the team meetings the ideas for improvement for the ward were noted. This resulted in 11 to 29 ideas per team, for example involving informal caregivers in the intake process or reorganizing the communal areas on the ward. Table 3 shows the number of ideas for improvement per team and the number of quick wins and ideas that take more time to tackle. Some ideas for improvement were assessed as quick wins by some participants, while others estimated that these ideas will take more time. One example is involving the informal caregiver in the rehabilitation process.

Table 3. Outcome of team meeting: number of ideas for improvement per team

	Ideas for improvement	Quick wins	Ideas that take more time
Team 1	17	9	9
Team 2	29	12	11
Team 3	11	3	5
Team 4	16	10	10
Team 5	26	7	8

Table 4. Results of evaluation survey

	Number of answers (% of completed surveys)	Median (IQR)
How satisfied are you with the content of the statements?	37 (97.4)	8 (7-8)
How satisfied are you with the comprehensibility of the statements?	37 (97.4)	7 (6-8)
How satisfied are you with the outcome measure of plan/do/check/act?	37 (97.4)	7 (6-8)
How satisfied are you with your time investment to complete the CREATE-tool?	36 (94.7)	7 (6-8)
How satisfied are you with your time investment regarding the team discussion on the CREATE-tool?	36 (94.7)	8 (7-8)
How satisfied are you with the process during the team discussion of the CREATE-tool?	36 (94.7)	8 (7-8.25)
How relevant do you think the outcomes of the CREATE-tool are for your work?	36 (94.7)	8 (7-8)
To what extent do the results of CREATE-tool contribute to improving the challenging rehabilitation climate on your ward?	36 (94.7)	8 (7-8)
To what extent does first completing the CREATE-tool individually before it is discussed collectively in the team add value?	35 (92.1)	8 (7-8)
To what extent does jointly discussing the outcomes of the CREATE-tool add value?	34 (89.5)	8 (8-9)
To what extent does making an improvement plan add value?	36 (94.7)	8 (7.75-9)
To what extent does the CREATE-tool support the creation of a plan of action?	36 (94.7)	7 (6-8)
To what extent did you recognize your personal ideas in the team discussion about the CREATE-tool?	33 (86.8)	7 (6-8)
To what extent are you positively motivated in your daily work by the results of the CREATE-tool?	35 (92.1)	7 (6-8)
To what extent are you willing to use the CREATE-tool periodically (e.g. once every 2 years)?	36 (94.7)	8 (6-8)
How likely are you to recommend the use of the CREATE-tool to other rehabilitation wards?	36 (94.7)	7 (5-8)

IQR = Interquartile rate, n=38

Reporting phase

The field notes show the remarks made during the team meetings. Participants experienced difficulties using the PDCA methodology. This methodology forced them to think carefully about their answers, but also resulted in different outcomes between team members due to differences in interpretation. This was reinforced by the fact that not all participants had read the descriptions of the statements. Furthermore, not all participants were involved in all parts of the rehabilitation process. This made it hard to answer all statements, and therefore the answer option "not applicable" was missed. The field notes reported that all team meetings were animated and two hours was relatively short to discuss all clusters. Also reported was that some participants spoke up more than others.

A total of 38 participants completed the evaluation survey, the results are shown in Table 4. As not all participants completed the CREATE-tool or participated in the team meetings, not all participants were able to fill in all questions of the evaluation survey. This resulted in 34 to 37 answers per question. All questions were answered with a median score of 7 or 8, and only the question regarding recommending the use of the CREATE-tool to others scored 5 in the first quartile.

Participants indicated that they needed a median of 15 minutes to complete the CREATE-tool (IQR 15-21.25)

Discussion

The CREATE-tool for CRE that was tested in this study proved to be feasible for use by rehabilitation wards and delivered suggestions for improvement. The tool is based on earlier elaborate research regarding CRE. It combines evidence-based, expert-based, and experience-based knowledge in one evaluation tool (7-10). The lively discussions during the team meetings, the number of ideas for improvement and the scores in the evaluation survey led to positive answers to both research questions of this study.

The results of this study show that the CREATE-tool is able to identify the strengths and areas for improvement regarding CRE and visualize them in a table

and a radar chart. Furthermore, the CREATE-tool stimulates the discussion in teams and identifies areas for improvement in teams regarding CRE. Also, the used methodology of the CREATE-tool is feasible, and participants in this study reported satisfaction with the use of the CREATE-tool. Questions regarding the content, process, and the added value of using the CREATE-tool are all answered positively with a median score of 7 or 8.

During the development of the CREATE-tool, the PDCA rating was chosen because it can facilitate a discussion about the level of improvement, and the rating is of secondary importance. During the team meeting some participants mentioned that they considered the PDCA rating complicated because it forced them to think more carefully about their answers. In the evaluation survey, the question regarding satisfaction with the use of the PDCA methodology was answered with 7 (IQR 6-8). Also, the field notes showed that the variation in the rating of the statements was a rich source of discussion during the team meetings. The PDCA methodology is a frequently used methodology which is helpful to determine whether improvement occurs in a system or organization. It enables insight into improvement processes, and it is a standard rating system in literature concerning improvement management, organizational change, and quality management. (14-16) Moreover, the used PDCA methodology provided insight into improvement processes in the team meetings. Therefore, this methodology remains the best assessment method for the CREATE- tool, as the tool is used as an evaluation instrument and source for discussion during team meetings. However, more information and explanation on how PDCA should be used in practice is probably necessary to improve the user-friendliness of this tool.

In the evaluation survey, participants positively assessed the use of the CREATE-tool and indicated that the results of the self-assessment contribute to improving CRE on their ward. Only the question regarding advising other rehabilitation wards to use the tool scored a 5 in the first quartile. However, self-evaluation has proven to help organizations discern their strengths and areas for improvement, leading to improvement actions that can be monitored for progress. (11-13) Nevertheless, the field notes of the team meetings provide no explanation for the low score. The overall results of this study support that a self-evaluation tool is useful for monitoring the implementation of CRE in rehabilitation wards.

The CREATE-tool and current study focused on the perspectives of professionals regarding CRE on their rehabilitation ward, and rehabilitants and informal caregivers were therefore not part of the study. A recent scoping review by Lubbe et al. revealed that including the perspectives of rehabilitants on the rehabilitation process is important for improving the effectiveness of the rehabilitation. (18) In addition, the tool tested in this study also states that rehabilitants and informal caregivers must be part of the rehabilitation team, and their perspectives were included in the development of the current tool. (10) Therefore, it is advisable to develop a method for rehabilitants and informal caregivers to assess CRE, in addition to or concurrently with the CREATE-tool. In this way a CRE on a rehabilitation ward can be a co-creation between rehabilitants, informal caregivers, and professionals.

Limitations

Not all participants were aware of the short descriptions provided for each statement, which resulted in different interpretations by participants. If the CREATE-tool is implemented, a clear interface must be provided so that participants automatically see the short description of the statements.

Some participants mentioned that due to their professional role, they were not involved in all aspects of the rehabilitation process, making it difficult for them to answer all questions. This resulted in them estimating some answers, which may lead to differences within the team. For future use of the CREATE-tool, we recommend adding an answer category "I don't know".

At the start of the team meeting the participants received the statement level team results, visualized with the median and range. The range of answers at the statement level was very broad, which hampered the discussion, especially because some participants had difficulties answering some questions, which led to more unclear answers. For further use of the CREATE-tool, we therefore advise to visualize the team results using the mean and IQR.

Strengths

One of the strengths of this study is the diversity of participants' professional backgrounds. The participants represented all relevant professionals in geriatric

rehabilitation, i.e., nurses, physicians and therapists. (19) This resulted in an interdisciplinary assessment of CRE and associated interdisciplinary improvement plans.

The response rate for this study is very high in both the rating of the CREATE-tool (80%) and the team meetings (80%), as well as the evaluation survey (76%). In organizational research the average response rate for studies that utilize data collected from individuals is 52.7% with a standard deviation of 20.4. (20)

Conclusion

The self-evaluation tool for a Challenging Rehabilitation Environment tested in this study is based on an evidence-based conceptualization. It has proven to identify areas for improvement for geriatric rehabilitation wards and has a feasible methodology. With the use of the CREATE-tool, rehabilitation wards can improve their CRE, and therefore improve the quality of geriatric rehabilitation.

This study was designed to test the feasibility of the CREATE- tool to identify areas of improvement regarding CRE. The aim was not to test whether the tool can be used to distinguish departments in terms of the development of their CRE, or to investigate whether there is a need for a specific phasing in implementing the statements and clusters. We recommend further research based on data from multiple departments, to investigate results between departments and possible phasing.

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Appendix 1

This table shows all statements of the tool with the corresponding results of the five teams (median, range and interquartile range). The short description for each statement is available via the corresponding author.

Participants received the instruction to rate all statements according to the Plan, Do, Check, Act methodology. An ascending order was followed, which meant that if a participant chose Act, by definition Plan, Do and Check had already been completed. Participants received the following description:

1. Plan: We made plans for working on this topic or thought about whether we want to work on this topic.
2. Do: We are currently carrying out actions on this topic.
3. Check: We continuously evaluate actions regarding this topic.
4. Act : We will make adjustments regarding this topic if necessary or possible, and have incorporated this subject into our daily practice.

Statement	Team 1	Team 2	Team 3	Team 4	Team 5
	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)
Cluster 1: Goals	***0.56***	***0.63***	***0.69***	***0.69***	***0.63***
We use the goals of the rehabilitant to guide the use of therapies and the duration of admission.	C (D-C / C)	C (P-C / D-C)	C (D-A / C)	C (P-A / D-C)	C (P-A / D-A)
We include goals, evaluations, exercises and the discharge process in the rehabilitation plan.	C (D-A / D-A)	D (P-A / D-C)	C (P-A/ D-A)	C (P-A / D-C)	C (D-A / C)
We cover both the inpatient period and rehabilitation at home in the rehabilitation goals.	D (P-C / D-C)	D (P-C / P-C)	D (P-A / D-C)	D (P-A / D-C)	D (P-A / P-D)
We view home visits as an integral part of rehabilitation.	P (P-A / P-C)	C (P-A / P-A)	C (P-A / D-C)	C (P-A / D-A)	D (P-A / D-C)
Cluster 2: Rehabilitant and informal caregiver	***0.61***	***0.64***	***0.55***	***0.61***	***0.59***
We prepare the rehabilitant and informal caregiver for the fact that rehabilitation does not stop after discharge.	C (D-A / C-A)	C (D-A / D-A)	C (P-A / D-C)	C (D-A / C)	C (D-A / D-C)
We formulate and adjust the rehabilitation plan in consultation with the rehabilitant and informal caregiver.	C (D-A / C)	C (P-A / D-C)	D (P-A / D-C)	C (P-A / C-A)	C (P-A / C-A)
We educate informal caregivers about skills needed during and after rehabilitation.	D (P-A / D-C)	C (P-A / D-A)	C (P-A / D-C)	D (P-C / D-C)	C (D-A / C)
We explain the medical condition to the rehabilitant and informal caregiver.	C (P-A / D-A)	C (P-A / D-A)	C (P-A / P-C)	C (D-A / D-A)	D (D-A / D)
We view the rehabilitant and informal caregiver as part of the rehabilitation team.	D (D-C / D)	D (P-A / D-C)	P (P-A / P-C)	D (D-C / D-C)	C (D-C / D-C)
We teach the rehabilitant and informal caregiver how to deal with cognitive problems.	D (D-C / D-C)	D (P-A / D-C)	D (P-C / D-C)	C (P-A / D-C)	D (P-A / P-D)
We teach the rehabilitant and informal caregiver how to manage stimuli and resilience.	C (P-A / C)	C (P-A / D-C)	C (P-A / D-C)	D (P-A / D-C)	D (P-A / D)

Statement	Team 1	Team 2	Team 3	Team 4	Team 5
	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)
We give attention to the informal caregiver's resilience, change of role, and grieving process.	C (P-A / D-A)	C (P-A / D-A)	D (P-C / P-D)	C (D-A / D-A)	D (P-C / D)
We let the rehabilitant and informal caregiver participate in the multidisciplinary consultation.	P (P-C / P-C)	D (P-A / P-C)	P (P-A / P-D)	D (P-A / P-A)	P (P-D / P)
We give rehabilitant and informal caregiver access to the reports and the possibility to contribute.	D (P-C / P-D)	D (P-A / P-A)	D (P-C / P-D)	D (P-A / D-C)	D (P-C / P-C)
We welcome informal caregivers on the rehabilitation unit throughout the day to participate in the rehabilitation process.	C (D-A / D-A)	D (P-A / D-A)	D (P-A / D-C)	D (D-A / D-A)	C (D-A / D-A)
Cluster 3: Staff aspects	***0.77***	***0.78***	***0.75***	***0.72***	***0.72***
We encourage the self-reliance and independence of rehabilitants.	A (C-A / C-A)	C (D-A / C-A)	C (D-A / C-A)	C (D-A / C-A)	C (D-A / C-A)
We see nurses in a treatment role, who practice daily tasks with rehabilitants during daily care.	A (C-A / C-A)	C (D-A / D-A)	C (D-A / C)	C (D-A / C-A)	C (D-A / D-C)
We apply an interdisciplinary working method and are jointly responsible for achieving goals.	C (D-A / C-A)	A (D-A / C-A)	A (D-A / C-A)	C (D-A / C-A)	C (C-A / C)
We are flexible, interested, empathetic, active, encouraging, and motivating.	C (C-A / C-A)	A (D-A / C-A)	A (C-A / A)	C (D-A / C-A)	A (D-A / C-A)
We share a vision of geriatric rehabilitation with the rehabilitation team and management.	C (D-A / C)	A (D-A / C-A)	C (P-A / D-C)	C (D-A / D-A)	C (D-A / C-A)
We take the learning style of the rehabilitant into account.	C (P-A / C)	C (P-A / P-C)	C (P-A / D-C)	C (D-A / C-A)	C (P-A / D-C)
We are equal with all disciplines and have no hierarchy.	C (P-A / C-A)	C (D-A / D-A)	A (P-A / A)	C (D-A / D-A)	A (D-A / C-A)
We encourage rehabilitants in an unambiguous manner.	C (D-A / D-C)	C (P-A / D-C)	C (P-A / C)	D (D-A / D-C)	D (D-A / D-C)

Statement	Team 1	Team 2	Team 3	Team 4	Team 5
	Median (range/IQR)	**Median (range/IQR)**	**Median (range/IQR)**	**Median (range/IQR)**	**Median (range/IQR)**
We deliberately choose to work on a rehabilitation ward.	A (C-A / A)	A (D-A / C-A)	C (P-A / D-A)	C (D-A / D-A)	A (P-A / C-A)
We work in accordance with current scientific knowledge on geriatrics and rehabilitation.	C (D-A / C)	C (D-A / D-C)	C (P-A / D-C)	C (D-A / D-A)	C (D-A / D-C)
We also focus on a meaningful life after rehabilitation.	C (P-A / D-C)	C (P-A / D-A)	C (D-A / D-C)	D (D-A / D-A)	C (D-A / C-A)
We encourage a positive atmosphere on the ward and contact between rehabilitants.	C (P-A / D-A)	C (D-A / C-A)	C (P-A / C-A)	C (D-A / D-A)	C (D-A / C)
We offer information in different ways and at multiple moments.	D (P-C / D-C)	C (P-A / D-A)	D (P-A / P-C)	C (D-A / D-A)	D (P-A / D-C)
We have a project leader or project group that implements and secures the challenging rehabilitation environment in manageable steps.	C (P-A / D-C)	D (P-A / D-C)	D (P-A / P-C)	C (P-A / D-A)	D (P-C / D)
On our ward practitioners are present outside office hours if this is in line with the rehabilitant's goals.	P (P-D / P)	P (P / P)	P (P-C / P)	C (P-A / P-C)	P (P-A / P-D)
We refer to patients as rehabilitants instead of patients.	A (C-A / A)	A (D-A / A)	A (D-A / A)	C (D-A / C-A)	C (D-A / D-A)
Cluster 4: Environmental aspects	***0.41***	***0.53***	***0.60***	***0.65***	***0.69***
Our ward has a challenging layout and provides safety to practice independently.	D (P-C /D)	D (P-A / D-C)	C (P-A / P-A)	D (D-A / D-C)	D (P-A / P-C)
We have exercise materials and ADL aids available on our ward.	D (D-C / D-C)	C (P-A / D-A)	C (D-A / D-A)	C (D-A / D-C)	C (P-A / D-C)
We offer rehabilitants the possibility to use exercise facilities and exercise rooms throughout the day.	P (P-D / P-D)	D (P-A / P-C)	C (P-A / D-C)	D (P-C / D-C)	D (P-A / P-D)
We offer tasty, healthy, and (protein) enriched food, prepared with readily available products.	D (D-C / D-C)	D (P-C / P-D)	C (P-A / C-A)	C (D-A / D-A)	C (D-A / D-C)

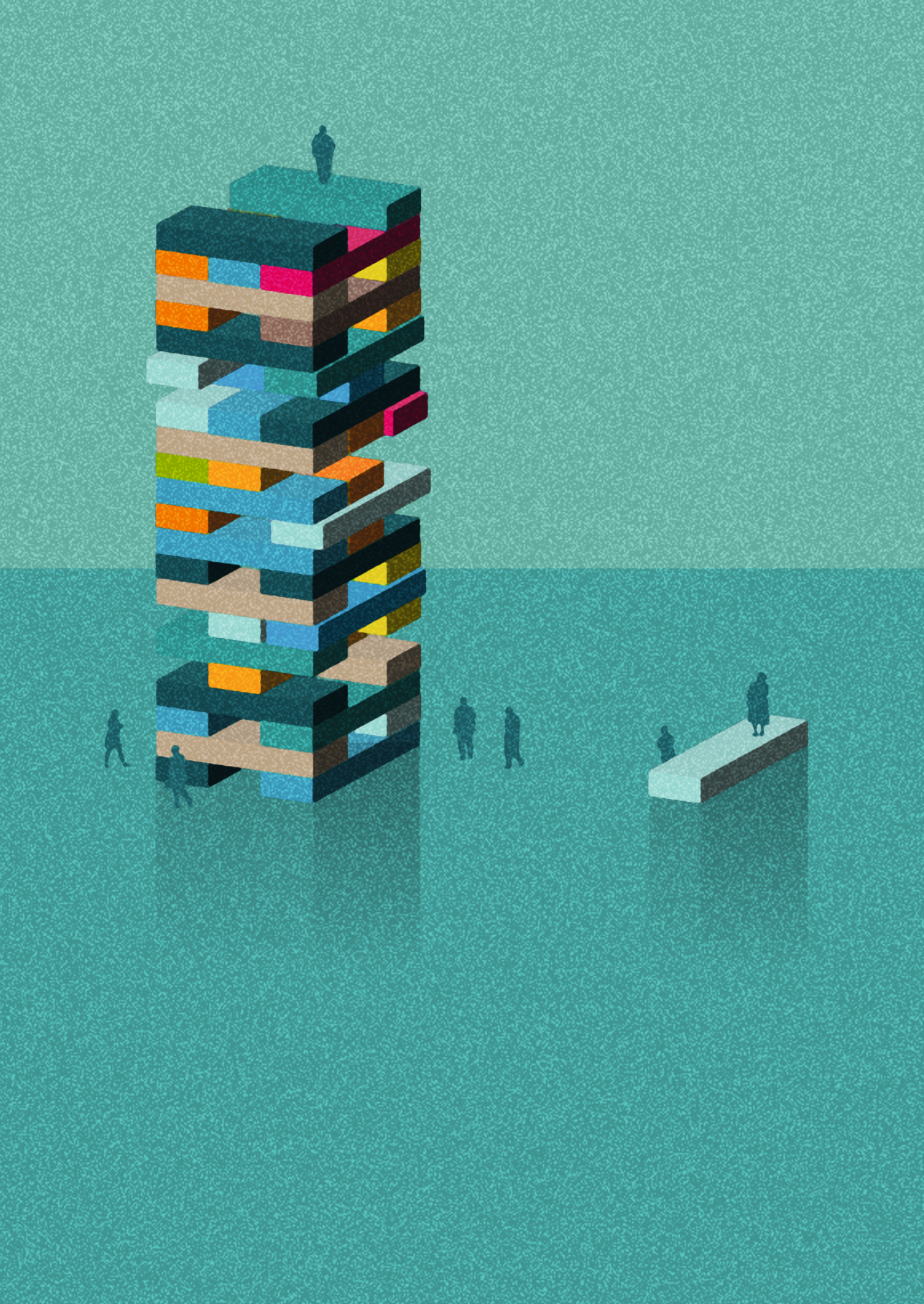
Statement	Team 1	Team 2	Team 3	Team 4	Team 5
	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)
On our ward, relevant rooms are within walking distance and handrails are provided in the hallways.	D (P-C / P-C)	D (P-A / P-A)	A (D-A / C-A)	D (P-A / P-A)	C (P-A / D-A)
On our ward, low-stimulus rooms and resting opportunities are available.	P (P-C / P-C)	D (P-A / P-C)	P (P-C / P)	D (P-C / P-C)	D (P-A / P-C)
On our ward it is possible to practice walking on different surfaces and to practice stair climbing.	P (P-C / P-D)	P (P-A / P-A)	D (P-A / D)	C (P-A / P-A)	C (P-A / D-C)
On our ward, the bedroom has a seating area that challenges the rehabilitant to get out of bed.	P (P-A / P-C)	P (P-A / P-C)	D (P-A / D-C)	C (P-A / P-A)	C (P-A / C-A)
On our ward, the exercise rooms of the treatment disciplines are integrated and clearly visible.	P (P / P)	P (P-A / P-C)	D (P-A / P-C)	D (P-A / P-C)	D (P-A / P-D)
On our ward, there is a common room for rehabilitants to stay and exercise.	D (P-C / D-C)	C (D-A / D-C)	A (P-A / P-A)	C (P-A / D-A)	C (P-A / D-C)
On our ward, landmarks/reference points/anchor points help the rehabilitant orientate in time and place.	D (P-C / P-C)	D (P-C / P-C)	C (P-A / C)	D (P-A / D-A)	C (D-A / C-A)
On our ward, games, computers, newspapers, and television are available to relax.	D (D-A / D-C)	C (D-A / D-A)	C (D-A / D-C)	C (P-A / D-C)	A (C-A / C-A)
On our ward, the rehabilitant has a single bedroom with a private bathroom.	P (P-D / P)	P (P-A / P-C)	P (P-D / P)	A (D-A / D-A)	A (C-A / A)
We provide treatment on the ward whenever possible.	D (P-D / D-C)	C (P-A / D-C)	A (P-A / C-A)	C (D-A / D-A)	A (C-A / A)
We offer rehabilitation close to the rehabilitant's place of residence.	C (C-A / C-A)	C (P-A / P-A)	P (P-A / P-C)	C (D-A / D-A)	A (D-A / C-A)

Statement	Team 1	Team 2	Team 3	Team 4	Team 5
	Median (range/IQR)	**Median (range/IQR)**	**Median (range/IQR)**	**Median (range/IQR)**	**Median (range/IQR)**
On our ward, the exercise rooms offer the opportunity to create privacy for the rehabilitant.	P (P-C / P-D)	C (P-A / P-A)	P (P-D / P)	D (P-A / P-C)	P (P-A / P-D)
On our ward, the layout matches the layout of the rehabilitant's home setting.	D (P-A / D)	D (P-A / P-C)	P (P-C / P)	D (P-D / P-D)	D (P-A / D)
We offer rehabilitation at a location near social activities.	D (P-C / P-C)	P (P-A / P-A)	P (P-A / P)	D (P-C / P-C)	D (P-C / P-C)
Our ward is small in size and serves a limited number of rehabilitants.	D (P-A / P-C)	A (D-A / A)	D (P-A / P-C)	D (P-A / P-C)	A (P-A / C-A)
Our ward is in a building for rehabilitation without long-term stay.	P (P-A / P-C)	P (P-A / P)	A (P-A / C-A)	A (D-A / A)	P (P-A / P)
Cluster 5: Exercise and peer support	***0.51***	***0.62***	***0.54***	***0.62***	***0.54***
We offer rehabilitants independent exercises focused on mobility and activities of daily living.	C (C-A / C-A)	A (D-A / A)	A (D-A / C-A)	C (D-A / D-A)	D (P-A / D-C)
We offer rehabilitants independent exercises suitable to be performed in the home setting.	C (D-A / C-A)	A (D-A / A)	A (D-A / D-A)	C (D-A / D-A)	D (P-A / D-C)
We practice daily therapeutic activities via task-oriented training, performed as it would be at home.	C (P-C /C)	A (P-A / C-A)	D (P-A / D-C)	C (P-C / D-C)	C (P-A / D-C)
We see eating (preparing meals) as a practice moment that is in line with individual goals.	C (P-C / C)	C (P-A / P-A)	C (P-A / D-C)	C (D-A / D-A)	D (P-A / D-C)
We encourage rehabilitants to have meals together.	A (C-A / A)	A (D-A / C-A)	A (D-A / A)	A (P-A / D-A)	A (C-A / A)
We offer group therapy focused on goals related to mobility and activities of daily living.	D (D-C / D-C)	D (P-A / D-A)	P (P-C / P-C)	C (P-A / D-A)	D (P-A / P-C)

Statement	Team 1	Team 2	Team 3	Team 4	Team 5
	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)
We match therapy moments with the rhythm and capacity of the rehabilitant, without fixed planning.	D (P-A / D-C)	A (D-A / C-A)	A (P-A / C-A)	C (D-C / D-C)	A (P-A / C-A)
We give rehabilitants challenging homework assignments which we evaluate.	D (P-A / D-C)	C (P-A / D-A)	P (P-A / P-A)	D (P-C / D-C)	D (P-A / D-C)
We stimulate peer contact so rehabilitants learn, encourage and support each other.	D (P-C / P-C)	D (P-A / P-A)	P (P-C / P-D)	C (D-A / C-A)	D (P-A / P-D)
We encourage rehabilitants to go outside on their own.	C (P-C / D-C)	D (P-A / P-C)	D (P-A / P-D)	D (P-A / P-C)	P (P-A / P-D)
We facilitate post-discharge therapies, if possible by the same practitioners.	C (P-C / D-C)	A (P-A / C-A)	P (P-C / P-C)	D (P-A / P-A)	C (P-A / D-C)
We offer group therapy focused on coping with grief, cognition, and communication.	P (P-C / P)	D (P-A / P-A)	P (P-D / P)	C (D-A / D-A)	P (P-A / P)
We cluster diagnosis groups as much as possible, for example stroke, trauma, etc.	P (P-D / P-D)	P (P-C / P-C)	C (P-A / D-C)	C (P-A / D-A)	C (P-A / D-A)
We offer rehabilitants additional therapy moments with the therapists during walk-in hours.	P (P / P)	P (P-C / P)	P (P-A / P)	P (P-D / P-D)	P (P / P)
We have visiting hours for visitors who have no informal care responsibilities.	P (P / P)	P (P-A / P)	A (D-A / C-A)	A (D-A / C-A)	A (D-A / A)
We encourage rehabilitants to work independently on improving communication, cognition, and coping with grief.	D (D-C / D-C)	D (P-A / P-C)	D (P-A / P-C)	D (D-A / D-A)	D (P-A / D)
We use eHealth to monitor and clarify changes in functioning.	P (P-D / P-D)	P (P-A / P-D)	P (P / P)	P (P-D / P-D)	P (P-D / P)
We use eHealth applications to make exercise fun and challenging.	P (P / P)	P (P-C / P-D)	P (P-C / P)	P (P-D / P-D)	P (P-D / P)

Statement	Team 1	Team 2	Team 3	Team 4	Team 5
	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)	Median (range/IQR)
We teach rehabilitants new skills such as how to use technology.	P (P-D / P)	D (P-C / P-C)	P (P-A / P-C)	P (P-A / P-C)	P (P-D / P)

IQR = interquartile range, P = Plan, D = Do, C = Check, A = Act



Chapter 7

General discussion

This thesis describes the results of the CREATE study (Challenging REhAbiliTation Environment). The overall aim of the CREATE study was to conceptualize a challenging rehabilitation environment, and to develop a tool to support rehabilitation wards in improving this.

The CREATE study is the first study which positions the concept of a (socio) therapeutic climate in Geriatric Rehabilitation. A (socio)therapeutic climate is a well secured concept in psychiatry and this broad perspective on treatment has proven its added value in this field.[1-3] The combination of the social, physical, and organizational environment is also used to achieve therapeutic goals in nursing home residents with dementia.[4] These positive outcomes gave inspiration to apply the broad approach of a (socio)therapeutic climate in the rehabilitation of older persons as a challenging rehabilitation environment (CRE). The concept of CRE contains more than only the contact or therapy moments lead by therapists. Therefore, in this thesis the name "challenging rehabilitation environment" is used. As the concept describes a broad approach aimed at challenging rehabilitants to achieve optimal rehabilitation results, this name describes the concept best.

To achieve the above-mentioned aim of this thesis, the following research questions were addressed:

1. Which aspects are important in a challenging rehabilitation environment and how can these be combined in a conceptualization?
2. To which extent is a team self-evaluation tool feasible to support rehabilitation wards by implementing a challenging rehabilitation environment?

In this final chapter of this thesis, the main research findings are presented and critically discussed. Hereafter, implications and recommendations for clinical practice, future research and education are presented.

Main research findings

The five studies presented in this thesis have jointly resulted in a conceptualization of CRE and an associated tool that can help rehabilitation wards implement CRE. The framework of the studies and chapters in this thesis has led to this conceptualization being a combination of evidence-based, expert-based, and experience-based knowledge.

The conceptualization of a challenging rehabilitation environment

Chapter 2 describes a narrative review into relevant literature concerning CRE. After a PubMed search, 51 articles were included, leading to seven relevant topics for CRE. These topics considered: 1) therapy time, 2) group training, 3) patient-regulated exercise, 4) family participation, 5) task-oriented training, 6) enriched environment, and 7) team dynamics.

Because CRE is a relatively new concept, there was a possibility that the above-mentioned review had not examined all aspects important to CRE. Therefore, two qualitative studies were performed. In **chapter 3** a qualitative study into the perspectives of rehabilitants and informal caregivers regarding CRE is described. And **chapter 4** describes a qualitative study into the perspectives of professionals. The participants of both studies confirmed the importance of the topics that had emerged in the narrative review, but they also mentioned new topics. A total of 15 rehabilitants, six informal caregivers, and 180 professionals participated in both studies. Participants in both studies were unanimous about the topics of interest to CRE, but the emphasis placed on the topics was different. As a result, the professionals' analysis led to 11 themes and the analysis of the rehabilitants and informal caregivers to 13 themes. The topics identified in both studies concerned 1) rehabilitant, 2) goals, 3) involving informal caregivers, 4) exercise, 5) daily schedule, 6) nutrition, 7) eHealth, 8) environmental aspects, 9) staff aspects, 10) organizational aspects, and 11) return home. For rehabilitants and informal caregivers, communication and peer support were two separate themes, while for professionals these topics fell under involving informal caregivers and exercise respectively.

In **chapter 5** concept mapping was used to combine the input of the first three studies into an evidence-based, expert-based, and experience-based conceptualization. The results from the previous studies were summarized in 70 statements, which were divided over five clusters ; goals, rehabilitant and informal caregiver, staff aspects, environmental aspects, and exercise and peer support.

The cluster *goals* summarizes aspects relevant for the goal setting process. In the next cluster, *rehabilitant and informal caregiver,* the focus is on factors concerning the rehabilitant and informal caregiver. In a CRE it is important that the rehabilitant and informal caregivers are part of the rehabilitation team. The third cluster focusses on *staff aspects*. Staff in a CRE should apply an interdisciplinary working method, and all team members should be focused on rehabilitation during daily activities. In the fourth cluster, *environment aspects* in a CRE are combined. The design of the rehabilitation ward should stimulate and challenge rehabilitants. The last cluster focusses on aspects relevant for *exercise and peer support*. Rehabilitants are encouraged to work on their rehabilitation throughout the day, which can be achieved by group training and patient regulated-exercise. In addition, peer support is encouraged, so that rehabilitants can learn from each other and encourage and support each other.

The team self-evaluation tool for a challenging rehabilitation environment

Based on the above-described conceptualization of CRE, a self-evaluation tool for teams regarding CRE was developed in the final study of this thesis (**chapter 6**). In this CREATE-tool an interdisciplinary representation of the rehabilitation team individually rated the 70 statements of the conceptualization of CRE using a plan, do, check, act methodology. These ratings were treated as ordinal data to convert them in individual and team standardized cluster ratings, which were presented in a radar diagram with five axes. The individual and team standardized cluster ratings were input for a team meeting in which the participants discussed the results per cluster and tried to identify the team's strengths and areas for improvement. After this discussion the participants each indicated three quick wins and three ideas for improvement that are important but take more time to implement.

In chapter 6 the CREATE-tool was tested in 5 rehabilitation wards, that included 50 team members. It showed that the CREATE-tool could identify areas for improvement for rehabilitation wards, and to be a feasible methodology for the assessment of areas for improvement.

Theoretical considerations

Although the framework for the development of the conceptualization and the CREATE-tool included a literature search and several rounds of systematic stakeholder involvement sessions, there are some theoretical themes that have not been extensively included in the tool, and these should here be discussed.

Neuropsychiatric symptoms

During the rehabilitation, rehabilitants and informal caregivers must cope with the life event that was the indication for the rehabilitation. This indication can lead to neuropsychiatric symptoms, especially in neurological disorders such as stroke, or when the rehabilitant has a delirium. Examples of neuropsychiatric symptoms are altered stimulus processing, overburden, decline of executive functions, loss of memory, loss of initiative, and problems with dealing with emotions. Literature has shown that neuropsychiatric symptoms like depression, disinhibition and anxiety are highly prevalent in rehabilitants, and these symptoms are negatively associated with quality of life and home discharge after rehabilitation.[5-9] In the qualitative study presented in chapter 3, rehabilitants and informal caregivers indicated that they experience a lack of attention for neuropsychiatric symptoms and the emotional aspects of the rehabilitation. These aspects were referred to a number of times in the conceptualization and the CREATE-tool, but this is only a small part of the tool and not always integrated into the whole process of rehabilitation. Therefore, there is a chance that these aspects will be overlooked, and professionals mainly focus on stimulating physical functioning during rehabilitation. Information about neuropsychiatric symptoms and their treatment may result in better rehabilitation outcomes.[5-9] Therefore, it is important in a CRE to pay attention to all aspects of rehabilitation, including neuropsychiatric symptoms.

Informal caregivers

The conceptualization of CRE includes informal caregivers being educated about the medical condition of their loved one, and to give attention to their coping ability, change of role, and grieving process. But above all, the informal caregiver is deployed as a team member who participates in the rehabilitation process. Involvement of informal caregivers in the rehabilitation of older adults leads to better rehabilitation outcomes and return home.[10] The primary informal caregivers are often spouses and children, and their caring roles involve providing assistance with daily activities, including physical care, and provision of emotional support.[11-13] Involving informal caregivers in the rehabilitation, and training and educating them in various aspects of the disease process such as recovery, interventions, and skills needed to care for their loved ones, has positive effects on the caregivers' quality of live and ability to cope with burden.[13,14]

Despite the sufficient evidence for the positive effects of involving informal caregivers in the rehabilitation process, we should not forget they have an emotional bond with the rehabilitant. They are not only a functional partner in the rehabilitation process and the life afterwards, but also an emotional partner of the rehabilitant. So, in order to maintain their role as informal caregiver in the long term, they must also be given space to be this emotional partner to their loved one.

Nudging

Nudges are subtle changes in the way options are presented, designed to influence decisions in a predictable and healthy way and achieved by relying on well-known decision-making tendencies.[15] The last 15 years nudging is increasingly used in research into behavioral change, for example to stimulate sustainable and healthier food choices, organ donation, and to improve sleep, physical activity and sedentary behavior.[16-19] Nudging is still a relatively new concept within geriatric medicine, which is why this theoretical concept was not included at the start of the CREATE study and was not presented as a topic to the participants of the qualitative studies of chapter 3 and 4.

Even though nudging was not explicitly mentioned in the studies in this thesis, certain aspects of CRE can be seen as nudging and stimulate rehabilitants to participate more active in their rehabilitation process. The statements in the

conceptualization about the layout of the ward being challenging and providing safety to practice independently can be an example of nudging. This could include exercise equipment in communal areas or chairs in corridors that can provide an extra moment of rest while walking. Another example of nudging is the statement about offering enriched food, which can be seen as nudging towards a healthy eating pattern. Therefore, nudging seems an interesting methodology to encourage rehabilitants and to apply within a CRE.

eHealth

Of the 70 statements in the conceptualization of CRE, only two statements mention the use of eHealth. eHealth can support monitoring of outcomes, clarify changes in functioning, and make exercise fun and challenging. However, it is remarkable that eHealth is not mentioned more often in the conceptualization, as it has proven its benefits in geriatric rehabilitation. Recent reviews have shown positive effects of eHealth, e.g. for improving physical activity, walking ability, and balance.[20-23] A possible explanation for the limited presence of eHealth in the conceptualization may be the way this conceptualization was developed. eHealth was not included in the search strategy for the review of chapter 2, so, all aspects regarding eHealth in the conceptualization originated from the input of professionals, rehabilitants and informal caregivers. As rehabilitants and informal caregivers are not always aware of the developments regarding eHealth in geriatric rehabilitation, the input regarding eHealth was mainly given by professionals. A recent international survey indicated that professionals felt that eHealth is complex for rehabilitants to use, and that a lack of knowledge and insufficient resources were important barriers for the use of eHealth in geriatric rehabilitation.[24]

These factors may explain why eHealth was not mentioned more often in the final conceptualization of CRE. Regardless that eHealth is only explicitly mentioned in two statements, it can support achieving the topics identified in the other statements. For example, eHealth can support in challenging rehabilitants to practice independently, it can help in providing appropriate information (e.g. about the condition for which they are rehabilitating), and it can support rehabilitants in managing stimuli and coping with disabilities.

Methodological considerations

The conceptualization of CRE and the CREATE-tool were created based on an extensive study that combined both literature and input from relevant stakeholders. Nevertheless, there are some aspects regarding the methodology that should be discussed here.

Dream or reality?

Qualitative research is the best method to come to an understanding of a phenomenon through the experiences of those involved.[25] Therefore, qualitative research was the preferred method to gain insight in the concept of CRE. In addition to the results of the narrative review described in chapter 2, the conceptualization of CRE and the CREATE-tool are based on the input of professionals, rehabilitants and informal caregivers in the two qualitative studies described in chapter 3 and 4. During these qualitative studies the participants were asked to dream freely about what they thought an optimal CRE should look like. It is debatable if participants described their real dream for an optimal CRE during these meetings. It is suspected that most participants mainly described the current situation and the improvements regarding CRE they were currently working on. As a result, not all possibilities and dreams for a CRE were mentioned in these studies.

To obtain the most diverse input possible, many different stakeholders were included. As a result, developments in various organizations were included, and through the participation of experts in the field of rehabilitation, an attempt has been made to include future developments in the final concept. This does not mean that it includes all future developments in the concept of CRE. Given the rapid follow-up of research in the field of geriatric rehabilitation, and in particular eHealth, the concept of CRE should be a dynamic concept.

Participants selection

One of the methodological issues regarding the studies in this thesis is the sampling of the professional participants. The studies described in chapter 4, 5 and 6 all used the input of professionals in the data collection. Because these three studies selected participants within the same organizations, it was inevitable that some professionals participated in all three studies. This can have influenced the

results by strengthening the internal validity, however the results may be less generalizable.

In chapter 4 the participants described their perspectives regarding CRE and in chapter 5 they clustered the statements regarding CRE. The results of these studies were integrated in the CREATE-tool. Therefore, professionals who participated in all three studies could (partially) recognize their vision in the final concept of CRE and the CREATE-tool. In chapter 6 the use of the CREATE-tool was evaluated in a survey. Because participants in this study were able to partially recognize their own perspectives in the content of the tool, this may have influenced how they completed this survey. In particular, the questions regarding the content and relevance of the statements may have been assessed more positively.

In the final concept of CRE and the CREATE-tool the input from various stakeholders was combined with the results of the narrative review described in chapter 2. The qualitative studies described in this thesis used input from participants from many different organizations, as well as input from (inter)national experts. This has led to a rich conceptualization that shows a broad vision of CRE, and the final conceptualization cannot be traced back to input form individual participants. Therefore, it is expected that previous participation in studies related to CRE did not influence the results of the survey regarding the use of the CREATE-tool in Chapter 6.

Regarding the sampling of participants, the external validity is another methodological issue in this thesis. All participants were motivated professionals, rehabilitants and informal caregivers. The organizations participating in these studies operated mainly in areas with a high socio-economic status. In addition, the participants mainly had a Dutch cultural background, only in the study in chapter 4 there was input from an international group of experts. This thesis has not examined the external validity of the CRE concept, therefore the results should be interpreted with caution regarding generalization towards populations with a different (cultural) background.

Concept mapping

After the studies described in chapter 2, 3 and 4, a lot of information about relevant aspects had to be combined in a conceptualization of CRE. One of the most important factors of a CRE is the equality of stakeholders. Therefore, it was important that the three main stakeholder groups (rehabilitant, informal caregiver and professional) were involved in the development of the final conceptualization. After considering different methods, we opted for concept mapping to develop the final conceptualization. Concept mapping is a highly structured procedure which can be used as an exploratory consensus procedure for modelling conceptual frameworks based on specific elements and the input of relevant stakeholders.[26,27] A major advantage of concept mapping is that all participants provide their input individually, without participants influencing each other. The input of each participant counts equally in the final conceptualization. This has led to a rich conceptualization of CRE which combines evidence-based, expert-based and experience-based knowledge. Aiming at the equality of stakeholders in a CRE, the concept mapping methodology seems most suitable for shaping the final conceptualization of CRE.

CREATE-tool

In this thesis it was studied to which extent a team self-evaluation tool is feasible to support rehabilitation wards by implementing CRE. Therefore, a delegation from the interdisciplinary team participated in the study in chapter 6. In this study, the participants were assigned by the team manager to achieve a good representation of the team. The readiness for change of the participants, was not considered. It is conceivable that this could influence the results in the study in chapter 6. Participants characterized with a lower readiness for change are likely to fill in the tool more conservatively and will therefore come up with fewer ideas to improve the CRE during the team meeting. They will probably complete the evaluation questionnaire less positively because they see less need for change. While participants whit a higher readiness for change are likely to identify more areas for improvement and are more positive about the entire tool.

If the CREATE-tool is going to be used in practice, it is good to include the readiness for change of team members when selecting participants. An ideal mix of participants consists not only of a representation of different occupations, but

also of participants with different natures. In this way, an improvement plan for CRE on a rehabilitation ward can be developed with the broadest possible support, which can have a positive contribution to the implementation of this plan.

Implications and recommendations

Implications for practice

The conceptualization of CRE originated from a narrative review and qualitative studies and the effectiveness of the total concept is not yet studied. The effects of the use of the CREATE-tool on the care process and rehabilitation outcomes are still unknown, as are the effects on the satisfaction and burden of the informal caregiver and employees. Nevertheless, many aspects of CRE have already been individually studied and proven to be effective. Hence, the concept of CRE as described in chapter 5 has a lot of potential and should be implemented in geriatric rehabilitation.

This thesis (chapter 6) showed that the CREATE-tool can be used as a team improvement instrument. It can help rehabilitation wards implement and improve CRE. During the study described in chapter 6, each team identified several points for improvement related to CRE. Team members indicated that this included both quick wins and points that took more time to realize. The survey in chapter 6 showed that team members were enthusiastic about using the tool and thought it contributed to improving CRE on their ward.

This thesis did not investigate the optimal frequency of using the CREATE-tool. The advice is to formulate an improvement plan for the geriatric rehabilitation ward based on the results of the CREATE-tool. If all improvement points from this plan have been achieved, the process of the CREATE-tool can be started again. If these points have not been achieved within 2 years, it is recommended to start the assessment process with the CREATE-tool again. In this way teams can identify whether new areas for improvement have raised regarding CRE.

Implications for education

This thesis has identified some important points for the education of professionals. One of the most important aspects of a CRE is interprofessional collaboration. The best place to start interprofessional collaboration is at the start of the training of future professionals! If students are taught to collaborate beyond the boundaries of their own field during their education, this will have an impact on the collaborations during their working life. As one of the participants of the study in chapter 4 said, "this interprofessional education should not stop when professionals have obtained their diploma, but requires continuous education". Interprofessional team trainings are an excellent way to stimulate interprofessional collaboration during regular working days. These team trainings will strengthen the team spirit, allow professionals to learn from each other, improve effective communication, and help professionals find each other in the workplace.[28]

What this thesis has further demonstrated is the importance of the environment in which rehabilitation takes place. A stimulating and challenging environment can challenge rehabilitants to work on their rehabilitation outside therapy hours. It is good to emphasize this importance of the environment in the training of healthcare professionals. But even more important is the training of non-health care professionals involved in the design of rehabilitation departments. They should be aware of the importance of a challenging environment for rehabilitants and be trained in ways to achieve this. Healthcare professionals and non-healthcare professionals must be taught how to speak each other's language to achieve the best possible result together. A good example of this is the "Bij Ons" tool, in which healthcare professionals and architects work together to design a nursing home which gives residents with dementia a feeling of home.[29]

In a CRE, professionals work together in an interdisciplinary manner and all team members are jointly responsible for increasing therapeutic activities of rehabilitants. Many different disciplines work together in an interdisciplinary team, but the professional with whom patients spent the most time is the nurse. If nurses incorporate exercises in their daily contact with rehabilitants, this can increase therapeutic activities with almost one hour a day.[30,31] It is therefore important that these practice moments are regularly mentioned during the training of pro-

fessionals, and all professionals involved in rehabilitation must regard the nurse as a therapist.

Future research

This thesis brings a solid foundation for the challenging rehabilitation environment, but like any research, it raises further research questions. One of the research questions for this thesis was which aspects are important for a CRE and how can they be combined in a conceptualization. Now that this conceptualization has been established, it is important to conduct further research into the effectiveness of using the concept of CRE for quality improvement activities. As mentioned above, specific parts of this concept have already been studied. It is necessary to conduct further research into the effect of combining all these aspects. CRE is an extensive concept and many rehabilitation wards have implemented certain parts of this concept, which is why action research seems to be an appropriate method for further research.

The second research question of this thesis has resulted in a team self-evaluation tool. This thesis shows evidence that this CREATE-tool is helpful for rehabilitation wards to identify their areas for improvement regarding CRE. Further research can be conducted into the long-term effect of the use of the CREATE-tool on the CRE of rehabilitation wards. This requires an implementation study and could be part of the above-mentioned action research.

Regarding the methodology of the studies that have resulted in the CREATE-tool, some limitations have been mentioned above. These limitations raise new research questions. Geriatric rehabilitation is a rapidly developing field of interest in both clinical practice and scientific research. It is not certain that all these developments are included in the conceptualization of CRE developed in this thesis. Therefore, it is important that we remain alert to new developments and, if applicable, update the current conceptualization.

The studies in this thesis mainly took place in the Netherlands. Recent studies have shown that despite of a consensus definition, there are international differences in the way geriatric rehabilitation is offered and in inclusion criteria.[32,33] To increase the external validity of the concept, it is paramount to study to what

extent the current conceptualization is endorsed internationally and whether the developed CREATE-tool is feasible in other countries.

Completing the full procedure of the CREATE-tool is relatively time-intensive, which is why it is recommended to only do this once every two years. During these two years it is desirable to monitor whether CRE on a ward is developing in the desired direction. A short and quick checklist should be developed and evaluated for this purpose.

Results of both the CREATE-tool and the conceptualization point in the direction of involving rehabilitants and informal caregivers in the rehabilitation process. It is necessary to investigate how they can be involved in shaping CRE on a rehabilitation ward, as this is under studied. It should be explored whether the CREATE-tool can be further developed into a tool for rehabilitants and informal caregivers.

This thesis focused on inpatient rehabilitation. But not all patients receive inpatient rehabilitation. And even if they do, the rehabilitation starts in the hospital and continues after discharge in their home situation. All these phases of rehabilitation together ensure an optimal rehabilitation result, and aspects of a CRE are important during all these phases. It is therefore recommended that further research will be conducted into which aspects of CRE are relevant during hospital admission and during rehabilitation at home. This may lead to further research into possible adjustments to the CREATE-tool so that it can be applied in these settings.

Epilogue: the case of my grandfather

In the general introduction of this thesis, the case of my grandfather was introduced. My grandfather rehabilitated before the concept of a challenging rehabilitation environment existed. His treatment was mainly monodisciplinary and besides his therapy moments, he had relatively small challenges and exercises. Nevertheless, after ten weeks he was able to walk without a walking aid and independent in his activities of daily living. But he didn't cycle again and felt less confident walking on uneven paths.

With the current knowledge, I suggest that he may have achieved better rehabilitation results if his rehabilitation had taken place within a CRE. Would he have achieved a higher therapeutic intensity and felt more confident and even stepped on his bike again?

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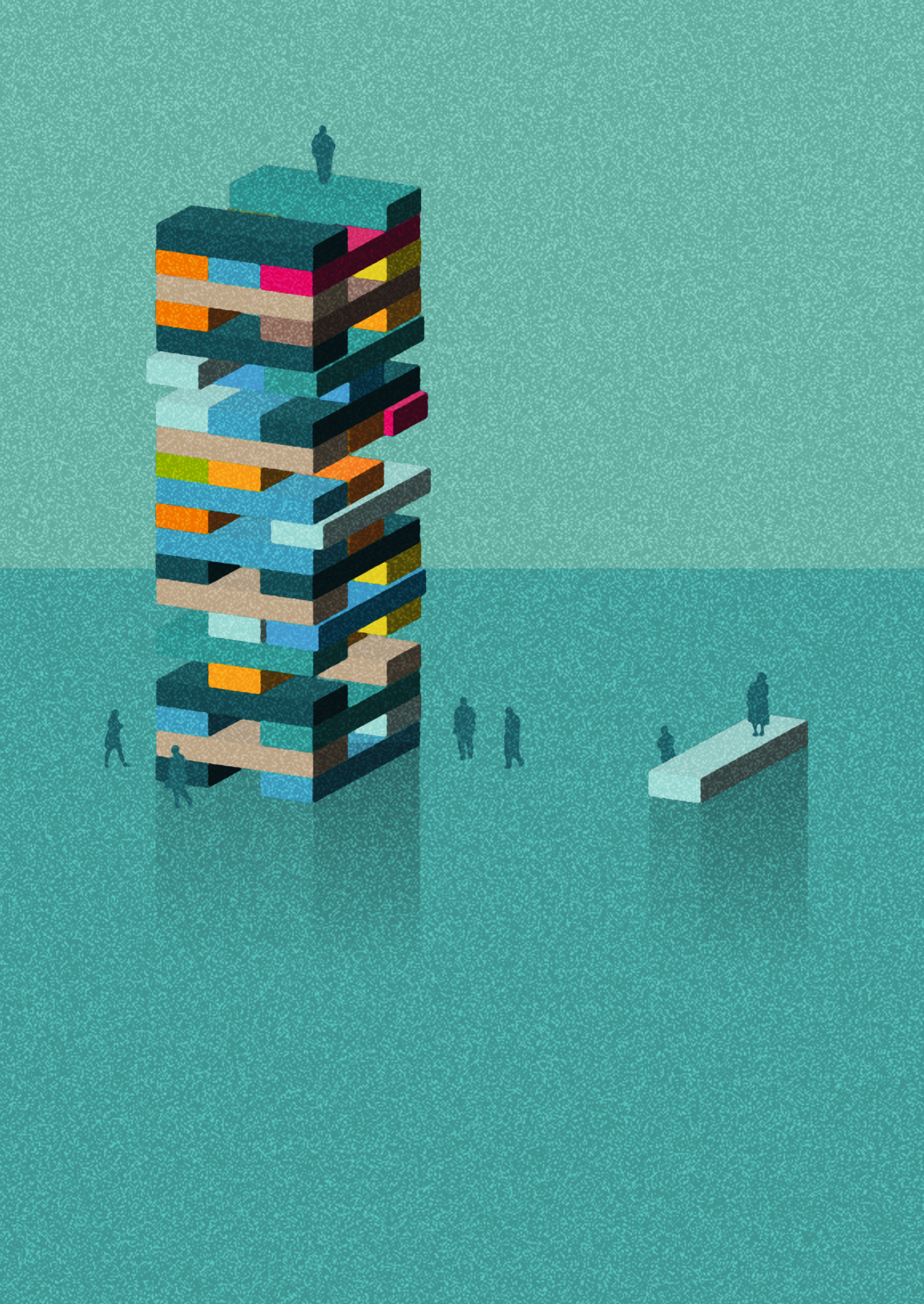

Summary

The global population is ageing, leading to an increase in multimorbidity, geriatric syndromes and hospital admissions. Common reasons for hospitalization in older persons are infections, cardiac problems, surgical interventions, stroke, cancer or fall related trauma. Due to a decreased strength, endurance and independence in activities of daily living, older persons are not always able to return to their own living situation after hospitalization. These persons are referred to geriatric rehabilitation.

Geriatric rehabilitation is a relatively young field and aims to optimize functional capacity, promote activity, and preserve functional reserve and social participation in older people with disabling impairments through a multidimensional approach of diagnostic and therapeutic interventions. Geriatric rehabilitation is offered by an interdisciplinary team consisting of nurses, elderly care physicians, physiotherapists, occupational therapists, psychologists, dietitians, and speech and language therapists. In the Netherlands, a total of 54.910 rehabilitants were treated in geriatric rehabilitation in 2021, which amounts to 1.5% of the Dutch population over 65 years of age. In 2019, 80% of the rehabilitants were able to return to their own living environment after geriatric rehabilitation.

The concept of (socio)therapeutic climate has been used for some time in fields such as psychiatry and care for residents with dementia. This concept is based on a broad approach to treatment, which considers the social, physical and organizational environment to achieve the therapeutic goals. In 2011, this broad philosophy was transferred to geriatric rehabilitation by Marieke Terwel. Although this idea was enthusiastically adopted by rehabilitation wards in the Netherlands, there was no scientific substantiation of the concept at that time. As a result, it was not clear which aspects were important in the concept. Consideration was given to increasing therapy time, group training, independent practice, task-oriented practice and family participation.

This thesis describes results of the CREATE study (Challenging REhAbiliTation Environment). The aim of the CREATE study was to conceptualize this concept and the development of a tool to support rehabilitation departments in its implemen-

tation. The concept describes the entire environment in which the rehabilitation takes place and is intended to challenge rehabilitants to achieve the best possible result from the rehabilitation. This total concept will be referred to in this thesis as the Challenging Rehabilitation Environment.

In this thesis the following research questions were addressed:

1. Which aspects are important in a challenging rehabilitation environment and how can these be combined in a conceptualization?
2. To which extent is a team self-evaluation tool feasible to support rehabilitation wards by implementing a challenging rehabilitation environment?

Main research findings

In **Chapter 2**, evidence for the challenging rehabilitation environment was sought in the literature. Because there was no scientific evidence for the entire concept, a narrative review was used to examine various aspects that are relevant to the challenging rehabilitation environment. This review included 51 articles, from which a total of 7 main topics were identified. These involved: 1) therapy time; the level of physical activity and the relationship with rehabilitation outcomes, 2) group training; can be used to increase therapy time and achieve goals, e.g. in the areas of mobility and activities of daily living, 3) patient-regulated exercise; this increases the level of self-management and therapy time, 4) family participation; this can have a positive effect on rehabilitation outcomes and increases therapy time, 5) task-oriented training; in addition to therapy, nurses can stimulate rehabilitants to perform meaningful tasks that improve functional outcomes, 6) enriched environment; this can challenge rehabilitants to be active in social and physical activities, and 7) team dynamics; shared goals and good communication in a transdisciplinary team improves the quality of rehabilitation.

As the challenging rehabilitation environment was a relatively new concept with different interpretations on various wards, it was unclear if this review captured all relevant aspects. Therefore, the two qualitative studies described in **chapters 3 and 4** were conducted simultaneously. **Chapter 3** describes a qualitative study into the perspectives of rehabilitants and informal caregivers regarding the challenging rehabilitation environment. A total of 15 rehabilitants and six informal caregivers participated in telephone interviews or focus groups. These partici-

pants all had recent experience in (geriatric) rehabilitation. Thematic analysis led to 13 themes, divided into nine themes related to the rehabilitation process and four themes related to the organizational process. The themes related to the rehabilitation process had to do with: 1) rehabilitant; attention for resilience, motivation, cognition and emotional aspects, 2) rehabilitant centered; goal setting, coping and physical and cognitive functioning, 3) informal caregivers; involving informal caregivers and attention for their resilience and the relationship between informal caregiver and rehabilitant, 4) communication; aligning the rehabilitation process, 5) exercise; increasing intensity by using task-oriented exercise, patient-regulated exercise and group training, 6) peer support; for recognition and learning from each other, 7) daily schedule; influence on the planning and activities outside therapy, 8) nutrition; provides energy for rehabilitation, and 9) eHealth; this makes rehabilitation more challenging and fun. The themes related to the organizational process were: 1) environmental aspects; single bedrooms, shared room for activities and therapy options on the ward, 2) staff aspects; a small team with a motivating and empathetic attitude, 3) organizational aspects; organized in an efficient way, and 4) return home; a well-prepared discharge process with attention to home visits.

In **chapter 4** the perspective of professionals regarding the challenging rehabilitation environment were studied. For this purpose, 13 focus groups were organized with both national and international experts and rehabilitation professionals. In addition, four workshops were given at two Dutch conferences. A total of 69 professionals participated in a focus group and 180 professionals in a workshop. Thematic analysis led to 11 relevant themes for the challenging rehabilitation environment. The themes were similar to those that emerged in the study with rehabilitants and informal caregivers. However, in the analysis of this study, the theme of communication was a subtheme in involving informal caregivers and the theme of peer support was a subtheme in the theme of exercises. This led to seven themes related to the rehabilitation processes: 1) rehabilitant; attention for resilience and cognitive functioning, 2) goals; setting personal goals, 3) exercise; increasing exercise intensity, 4) daily schedule; following the daily rhythm, 5) involving the client system; informal caregivers participation, 6) nutrition; influences rehabilitation capability, and 7) technology; makes rehabilitation more safe and challenging. Four themes were identified regarding the organizational

processes: 1) environmental aspects; encourages exercises, 2) staff aspects; an interdisciplinary team, 3) organizational aspects; implementing a challenging rehabilitation environment requires a shared vision, and 4) factors outside the ward; such as a well-prepared discharge process.

In **chapter 5**, the data from the first three studies were combined by means of concept mapping into an evidence-based, expert-based and experience-based conceptualization of the challenging rehabilitation environment. For this purpose, 70 statements were extracted from the first 3 studies. 20 (para)medics, 11 nurses and 15 rehabilitants and informal caregivers participated in the study. All participants assessed the statements for relevance and clustered the statements into related topics. Using the statistical procedure of concept mapping, a broadly supported classification into clusters was developed based on this input. This resulted in a division into five clusters;

1) Goals;
   Aspects that are relevant to the goal setting process. The goals should cover both the inpatient and outpatient period of rehabilitation. These goals should be used as a guidance through the rehabilitation process in terms of the use of therapies and the duration of the rehabilitation process. This cluster also describes that home visits are an integral part of rehabilitation.
2) Rehabilitant and informal caregiver;
   This cluster focuses on factors related to the rehabilitant and informal caregiver. In a challenging rehabilitation environment, it is important that they are part of the rehabilitation team. For example, they must be involved in formulating the rehabilitation plan, participate in multidisciplinary consultations and have access to and be able to report in the reports. In addition, it is important that rehabilitant and informal caregiver are educated about the medical condition that initiated the rehabilitation, how to deal with associated cognitive problems, and how to manage stimuli and resilience. It is also desirable if they are trained in the skills they need during and after rehabilitation.
3) Staff aspects
   In a challenging rehabilitation environment, staff should apply an interdisciplinary working method, which implies that there is no hierarchy. All employees are jointly responsible for achieving rehabilitation goals, have a rehabili-

tative mindset and integrate exercise moments into their daily contact with rehabilitants. In addition, the team members take the learning style of the rehabilitant into account and offer information in diverse ways and at multiple times. Staff members work in accordance with current scientific knowledge on geriatrics and rehabilitation. The rehabilitation team and management also have a shared vision on rehabilitation and the challenging rehabilitation environment.

4) Environmental aspects
   The overall layout of the rehabilitation ward is challenging and provides safety for rehabilitants to practice independently. This can be achieved, for example, by means of a seating area in the bedroom that invites rehabilitants to get out of bed, relevant areas within walking distance, or handrails in the hallways. Treatment takes place on the ward as much as possible and rehabilitants can use the exercise facilities throughout the day. Rehabilitants have their own bedroom, but can also use a common room. This gives them the opportunity to dose their number of stimuli. This cluster further states that the food must be tasty, healthy and (protein) enriched, prepared as much as possible with readily available products.
5) Exercise and peer support
   Exercises in a challenging rehabilitation environment focuses on goals regarding mobility, activities of daily living, grief, cognition and communication. Rehabilitants are encouraged to work on their rehabilitation throughout the day, for example through homework exercises. Daily therapeutic activity occurs via task-oriented training. In addition, group therapy is used to achieve rehabilitation goals and to stimulate peer support. Joint meals contribute to peer support and achieving the rehabilitation goals. In a challenging rehabilitation environment, the daily rhythm of the rehabilitant is followed. This means that there is no fixed planning. Informal caregivers are welcome on the ward throughout the day, but other visitors have visiting hours. eHealth is used to make exercises more fun and challenging and can support monitoring and visualizing changes in functioning of rehabilitants.

Using the conceptualization described above, a self-assessment tool for teams was developed in **Chapter 6**, the CREATE-tool. This tool consists of 70 statements divided over the five described clusters. A representation of the inter-

disciplinary team individually assessed all statements using the plan, do, check, act methodology. These ratings were considered as ordinal data and converted into individual and team standardized cluster ratings. These ratings were shown on a five-axis radar chart. The individual and team ratings were the input for a team meeting, where the participants discussed the results per cluster. They tried to identify the strengths and areas for improvement per cluster. The areas for improvement were noted on a flip chart and after the discussion, all team members indicated three quick wins and 3 larger areas for improvement. In **chapter 6,** this methodology was tested on five rehabilitation wards. A total of 28 (para)medics and 22 nurses participated in the study. Afterwards, these participants completed an evaluation survey. The study showed that the tool was helpful in identifying strengths and areas for improvement of a rehabilitation ward. Between 11 and 29 areas for improvement were identified per team. The participants were all very satisfied with the use of the tool, which was reflected in a median score of 7 or 8 on all evaluation questions.

Conclusion

The studies in this thesis jointly led to an evidence-based, expert-based and experience-based conceptualization of the challenging rehabilitation environment in five clusters. This conceptualization has been incorporated into the CREATE-tool, a team-self assessment tool that can be used to implement and evaluate the challenging rehabilitation environment in geriatric rehabilitation departments. This CREATE-tool is able to identify areas for improvement for the challenging rehabilitation environment at ward level and professionals are satisfied with the use of the tool. This thesis did not investigate to what extent the use of the CREATE-tool contributes to the rehabilitation outcomes of individual rehabilitants or to the improvement of the challenging rehabilitation environment at ward level. In previous studies, components of the CREATE-tool have proven their effect on rehabilitation outcomes. It is therefore recommended to use the CREATE-tool at least once every two years to identify the ward's areas for improvement. In addition, geriatric rehabilitation is a rapidly developing field. This also means that the conceptualization of the challenging rehabilitation environment is a dynamic concept and requires continuous further development.

Samenvatting

De wereldwijde populatie is aan het vergrijzen. Dit leidt tot een toename van multimorbiditeit, geriatrische syndromen en ziekenhuisopnames. Veel voorkomende redenen waarom ouderen in het ziekenhuis worden opgenomen zijn infecties, cardiale problematiek, operatieve interventies, beroerte, kanker of trauma als gevolg van een val. Als gevolg van een afgenomen kracht, conditie en zelfstandigheid in activiteiten van het dagelijks leven, zijn ouderen na ziekenhuisopname niet altijd in staat om naar hun eigen woonsituatie terug te keren. Deze ouderen worden verwezen naar geriatrische revalidatie.

Geriatrische revalidatie is een relatief jong vakgebied en heeft als doel om middels een multidimensionale benadering van diagnostische en therapeutische interventies, de functionele capaciteit te optimaliseren, activiteiten te bevorderen en functionele reserves en sociale participatie te behouden bij ouderen die een achteruitgang hebben ervaren. Geriatrische revalidatie wordt aangeboden door een interdisciplinair team bestaande uit verzorgende, verpleegkundigen, specialist ouderengeneeskunde, fysiotherapeuten, ergotherapeuten, psychologen, diëtisten en logopedisten. In Nederland werden in 2021 in totaal 54.910 revalidanten behandeld in de geriatrische revalidatie, wat neerkomt op 1,5% van de Nederlandse bevolking boven de 65 jaar. In 2019 was 80% van de revalidanten na geriatrische revalidatie in staat om terug te keren naar hun eigen leefomgeving.

In vakgebieden zoals de psychiatrie en de zorg voor bewoners met dementie wordt al langere tijd gewerkt met het concept (socio)therapeutisch klimaat. Dit is gebaseerd op een brede benadering van behandeling, waarbij zowel wordt gekeken naar de sociale, fysieke als organisatorische omgeving voor het behalen van de therapeutische doelen. In 2011 werd dit brede gedachtegoed overgebracht naar geriatrische revalidatie door Marieke Terwel. Hoewel dit gedachtegoed enthousiast werd overgenomen door revalidatieafdelingen in Nederland, ontbrak op dat moment een wetenschappelijke onderbouwing van het concept. Hierdoor was niet duidelijk welke aspecten belangrijk waren in het concept, gedacht werd aan het verhogen van de therapie tijd, groep training, zelfstandig oefenen, taak-georiënteerd oefenen en familieparticipatie.

In dit proefschrift is binnen de CREATE studie (Challenging REhAbiliTation Environment) onderzoek gedaan naar de conceptualisering van dit concept en het ontwikkelen van een tool om revalidatieafdelingen te ondersteunen bij het implementeren. Het concept beschrijft de gehele omgeving waarin de revalidatie plaats vindt en is bedoeld om revalidanten uit te dagen om een zo optimaal mogelijk resultaat van de revalidatie te behalen. Dit totale concept zal in dit proefschrift worden benoemd als het uitdagend revalidatie klimaat (Englisch: Challenging Rehabilitation Environment).

In dit proefschrift staan twee onderzoeksvragen centraal:

1. Welke aspecten zijn belangrijk in een uitdagend revalidatieklimaat en hoe kunnen deze gecombineerd worden in een conceptualisering?
2. In hoeverre is een team zelf-evaluatie tool toepasbaar om revalidatieafdelingen te ondersteunen bij het implementeren van een uitdagend revalidatieklimaat?

Belangrijkste bevindingen van het proefschrift

In **hoofdstuk 2** is in de literatuur een wetenschappelijke onderbouwing voor het uitdagend revalidatieklimaat gezocht. Omdat een wetenschappelijke onderbouwing van het gehele concept ontbrak, is middels een narrative review gekeken naar de onderbouwing van verschillende aspecten die relevant zijn voor het uitdagend revalidatieklimaat. In deze review werden 51 artikelen geïncludeerd, waaruit in totaal 7 hoofdonderwerpen werden gedestilleerd. Deze hadden te maken met: 1) therapie tijd; het niveau van fysieke activiteit en het verband tussen dit niveau en de revalidatie uitkomsten, 2) groepstraining; kan gebruikt worden voor het verhogen van de therapie tijd en het behalen van doelen onder andere op het gebied van mobiliteit en activiteiten van het dagelijks leven, 3) zelfstandig oefenen; dit verhoogt het niveau van zelfmanagement en de therapie tijd, 4) familie participatie; dit kan een positief effect hebben op de revalidatie uitkomsten en de therapietijd verhogen, 5) taak-georiënteerd trainen; in aanvulling op de therapiemomenten met behandelaren kan verpleging de revalidant stimuleren om betekenisvolle taken uitvoeren die de functionele uitkomsten kunnen verbeteren, 6) verrijkte omgeving; dit kan revalidanten uitdagen om actief te zijn in sociale en fysieke activiteiten, en 7) team dynamiek;

gezamenlijke doelen en goede communicatie in een transdisciplinair werkend team verbeterd de kwaliteit van de revalidatie.
Omdat het uitdagend revalidatieklimaat een relatief nieuw concept was en verschillend werd geïnterpreteerd, was de kans groot dat met deze review niet alle relevante aspecten waren opgehaald. Daarom werden gelijktijdig de twee kwalitatieve studies beschreven in **hoofdstuk 3 en 4** uitgevoerd. In **hoofdstuk 3** is de kwalitatieve studie naar de perspectieven van revalidanten en mantelzorgers op het uitdagend revalidatieklimaat beschreven. In totaal hebben 15 revalidanten en zes mantelzorgers deelgenomen aan telefonische interviews of focusgroepen. Deze deelnemers hadden alle recente ervaring in de (geriatrische) revalidatie. De thematische analyse van deze gesprekken leidde tot 13 thema's, onderverdeeld over negen thema's met betrekking tot het revalidatie proces en vier thema's met betrekking tot het organisatorische proces. De thema's met betrekking tot het revalidatie proces hadden te maken met: 1) de revalidant; aandacht voor belastbaarheid, motivatie, cognitie en emotionele aspecten, 2) revalidant georiënteerd; het stellen van doelen, coping en het niveau van fysiek en cognitief functioneren, 3) mantelzorgers; het betrekken van mantelzorgers en aandacht hebben voor hun belastbaarheid en de relatie tussen mantelzorger en revalidant, 4) communicatie; voor het afstemmen van het revalidatieproces, 5) oefeningen; het verhogen van de intensiteit door middel van taak-georiënteerd trainen, zelfstandig oefenen en groepstraining, 6) lotgenotencontact; voor (h)erkenning en het van elkaar leren, 7) dagstructuur; het hebben van invloed op de planning en de aanwezigheid van activiteiten naast de therapie, 8) voeding; geeft energie voor de revalidatie, en 9) eHealth; dit maakt de revalidatie uitdagender en leuker. De thema's met betrekking tot het organisatorische proces waren: 1) omgevingsaspecten; eenpersoons kamers, gezamenlijke ruimte voor activiteiten en therapie mogelijkheden op de afdeling, 2) medewerker aspecten; een klein team met een motiverende en empathische houding, 3) organisatorische aspecten; op een efficiënte manier georganiseerd, en 4) terugkeer naar huis; een goed voorbereid ontslagtraject met aandacht voor huisbezoeken.

In **hoofdstuk 4** werd vervolgens gekeken naar het perspectief van professionals op het uitdagend revalidatieklimaat. Hiervoor werden 13 focusgroepen georganiseerd met zowel nationale als internationale experts en medewerkers van revalidatieafdeling. Daarnaast werden vier workshops op twee nationale con-

gressen gegeven. In totaal hebben 69 professionals deelgenomen aan een focusgroep en 180 professionals aan een workshop. Thematische analyse leidde tot 11 relevante thema's voor het uitdagend revalidatieklimaat. De thema's waren vergelijkbaar met de thema's die in de studie met revalidanten en mantelzorgers naar voren waren gekomen. Echter was in de analyse van deze studie het thema communicatie een subthema bij het betrekken van de mantelzorgers en het thema lotgenotencontact een subthema bij het thema oefeningen. Dit leidde tot zeven thema's die betrekking hebben op het revalidatie proces: 1) revalidant; aandacht voor belastbaarheid en cognitief functioneren, 2) doelen; het stellen van persoonlijke doelen, 3) oefeningen; het verhogen van de oefenintensiteit, 4) dagstructuur; het volgen van het dagelijks ritme, 5) betrekken van het cliënt systeem; mantelzorgparticipatie, 6) voeding; beïnvloedt de revalidatiecapaciteit, en 7) technologie; maakt revalidatie veiliger en uitdagender. Met betrekking tot het organisatorische proces werden vier thema's geïdentificeerd: 1) omgevingsaspecten; stimuleert oefenen, 2) medewerkersaspecten; een interdisciplinair team, 3) organisatie aspecten; het implementeren van een uitdagend revalidatieklimaat vraagt een gezamenlijke visie, en 4) factoren buiten de afdeling; zoals een goed voorbereid ontslag traject.

In **hoofdstuk 5** is de data uit de eerste drie studies middels concept mapping gecombineerd in een evidence-based, expert-based en experience-based conceptualisering. Hiervoor werd en uit de eerste 3 studie 70 stellingen gedestileerd. Aan de studie namen 20 (para)medici, 11 verzorgende en verpleegkundigen en 15 revalidanten en mantelzorgers deel. Alle deelnemers beoordeelden de stellingen op relevantie en clusterden de stellingen in bij elkaar horende onderwerpen. Met behulp van de statistische procedure van concept mapping is met deze input voor het uitdagend revalidatieklimaat een breed gedragen indeling in clusters ontwikkeld. Dit resulteerde in een indeling in vijf clusters;

1) Doelen;
   Aspecten die relevant zijn voor het proces van doelen stellen. De doelen zouden zowel de klinische als de ambulante fase van de revalidatie moeten beslaan. Deze doelen moeten leidend zijn in de inzet van therapieën en de duur van het revalidatietraject. Ook wordt in dit cluster beschreven dat huisbezoeken een integraal onderdeel van revalidatie zijn.

2) Revalidant en mantelzorger;
   Dit cluster heeft betrekking op factoren die te maken hebben met de revalidant en mantelzorger. In een uitdagend revalidatieklimaat is het belangrijk dat zij onderdeel zijn van het revalidatieteam. Zo moeten ze betrokken worden bij het opstellen van het revalidatieplan, deelnemen aan het multidisciplinair overleg en toegang hebben tot en kunnen rapporteren in het elektronisch cliëntdossier. Daarnaast is het belangrijk dat ze uitleg krijgen over de aandoening die aanleiding was voor de revalidatie, hoe ze om moeten gaan met bijbehorende cognitieve problematiek en hoe om te gaan met veranderde prikkelgevoeligheid en belastbaarheid. Ook is het wenselijk als ze geschoold worden in vaardigheden die ze tijdens en na de revalidatie nodig hebben.
3) Medewerkersaspecten;
   In een uitdagend revalidatieklimaat werken medewerkers op een interdisciplinaire manier samen, wat inhoudt dat er geen hiërarchie is. Alle medewerkers zijn gezamenlijk verantwoordelijk voor het behalen van de revalidatiedoelen, hebben een revaliderende mindset en integreren oefenmomenten in hun dagelijkse contact met revalidanten. Daarnaast houden de teamleden rekening met de leerstijl van de revalidant en bieden ze informatie op verschillende manieren en meerdere momenten aan. De medewerkers zijn op de hoogte van de laatste inzichten met betrekking tot revalidatie en geriatrie. Ook heeft het revalidatieteam en management een gezamenlijke visie op revalidatie en het uitdagend revalidatieklimaat.
4) Omgevingsaspecten;
   De algehele indeling van de revalidatieafdeling is uitdagend en biedt veiligheid aan revalidanten om zelfstandig te oefenen. Dit kan bijvoorbeeld bereikt worden door middel van een zitje in de slaapkamer dat uitnodigt om uit bed te komen, relevante ruimtes op loopafstand of leuningen in de gangen. Behandeling vindt zo veel mogelijk plaats op de afdeling en revalidanten kunnen de gehele dag gebruik maken van oefenmogelijkheden. Revalidanten hebben een eigen slaapkamer, maar kunnen ook gebruik maken van een gezamenlijke ruimte. Dit geeft ze de mogelijkheid om de hoeveelheid prikkels te doseren. In dit cluster wordt verder benoemd dat de voeding lekker, gezond en (eiwit) verrijkt moet zijn, zoveel mogelijk bereid met regulier verkrijgbare producten.

5) Oefeningen en lotgenotencontact;
   Oefeningen in een uitdagend revalidatieklimaat focussen op doelen op het gebied van mobiliteit, activiteiten van het dagelijks leven, rouw, cognitie en communicatie. Revalidanten worden uitgedaagd de hele dag aan hun revalidatie te werken, bijvoorbeeld door middel van huiswerkoefeningen. De dagelijkse therapeutische activiteit wordt zoveel mogelijk door middel van taak-georiënteerd trainen uitgevoerd. Daarnaast wordt groepstherapie ingezet voor het behalen van revalidatiedoelen en het stimuleren van lotgenotencontact. Ook gezamenlijke eetmomenten dragen bij aan lotgenotencontact en het behalen van de revalidatiedoelen. In een uitdagend revalidatieklimaat wordt het dagritme van de revalidant gevolgd. Dit betekent dat er geen vaststaande therapieplanning is. Mantelzorgers zijn gedurende de hele dag welkom op de afdeling, maar overig bezoek heeft bezoektijden. eHealth wordt ingezet om oefeningen leuker en uitdagender te maken en kan ondersteunen bij het monitoren en in beeld brengen van veranderingen in functioneren.

Met behulp van de hierboven beschreven conceptualisering werd in **hoofdstuk 6** een zelf-evaluatie tool voor teams ontwikkeld, de CREATE-tool. Deze tool bestaat uit 70 stellingen verdeeld over de hierboven beschreven vijf clusters. Een vertegenwoordiging van het interdisciplinaire team beoordeeld individueel alle stellingen met behulp van de plan, do, check, act methodologie. Deze beoordelingen werden beschouwd als ordinale data en omgezet in individuele en team gestandaardiseerde cluster beoordelingen. Deze beoordelingen werden getoond op een spinnenwebdiagram met vijf assen. Deze individuele en team beoordelingen waren de input voor een team meeting, waarbij de deelnemers per cluster de resultaten bespraken. Hierbij probeerden ze per cluster de sterke punten en de verbeterpunten te identificeren. De verbeterpunten werden op een flap-over genoteerd en na de discussie gaven alle teamleden drie quick wins en 3 grotere verbeterpunten aan. In **hoofdstuk 6** werd deze methodologie getoetst op vijf revalidatie afdelingen. Aan de studie deden in totaal 28 (para)medici en 22 verpleging en verzorging mee. Na afloop vulden deze deelnemers een evaluatie enquête in. De studie liet zien dat de tool behulpzaam was bij het identificeren van de sterke en verbeterpunten van afdelingen. Per team werden tussen de 11 en 29 verbeterpunten geïdentificeerd.

De deelnemers waren allen zeer tevreden over het gebruik van de tool, wat zich toonde in een mediane score van 7 of 8 op alle evaluatie vragen.

Conclusie

De studies in dit proefschrift hebben gezamenlijk geleid tot een evidence-based, expert-based en experience-based conceptualisering van het uitdagend revalidatieklimaat in vijf clusters. Deze conceptualisering is verwerkt in de CREATE tool, een team-zelf evaluatie tool die gebruikt kan worden voor het implementeren en evalueren van het uitdagend revalidatieklimaat op geriatrische revalidatie afdelingen. Deze CREATE-tool is in staat om op afdelingsniveau verbeterpunten voor het uitdagend revalidatieklimaat te identificeren en professionals zijn tevreden over het gebruik van de tool. In dit proefschrift is niet onderzocht in welke mate het gebruik van de CREATE-tool bijdraagt aan de revalidatie uitkomsten van individuele revalidanten of de verbetering van het uitdagend revalidatieklimaat op afdelingsniveau. In eerdere studies hebben onderdelen waaruit de CREATE-tool is opgebouwd hun effect op revalidatie uitkomsten bewezen. Daarom wordt geadviseerd om de CREATE-tool minimaal eens per twee jaar te gebruiken om de verbeterpunten van de afdeling te identificeren. Daarnaast is de geriatrische revalidatie een snel ontwikkelend vakgebied. Dit maakt dat ook de conceptualisering van het uitdagend revalidatieklimaat een dynamisch concept is en continue doorontwikkeling vraagt.

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- Het uitdagend revalidatiieklimaat. Hogeschool InHolland, symposium samen leren in de GRZ, 2023, Amsterdam, the Netherlands (workshop).
- Verbeter jouw uitdagend revalidatieklimaat met de CREATE-tool. Jaarcongres GRZ, 2024, Utrecht, the Netherlands (workshop).

Products and materials

- CREATE-tool can be found on www.ukonnetwerk.nl/ukon-academy/ from 7 October 2024

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Curriculum vitae

Lian Tijsen was born on the 11th of Oktober 1985, in Eindhoven, the Netherlands. During her childhood, she lived in Budel. In 2004, she completed her secondary education with a Cum Laude Atheneum degree at the Bisschoppelijk College in Weert. Subsequently, she studied physical therapy at Fontys Allied Health Professions in Eindhoven, which she graduated in 2008 with a bachelors degree.

In 2008 Lian started working as a physical therapist at Zorgboog in Helmond / Bakel, the Netherlands. Here she started working with residents of nursing homes, but soon specialized in geriatric rehabilitation. In 2011 Lian started the master physical therapy for the geriatrics at HU University of Applied Sciences Utrecht, which she finished in 2014 with a Master of Science (with honors). During this education her interest in scientific research was further stimulated.

In 2018 Lian was given the chance to start her PhD research at the Department of Public Health and Primary Care at the Leiden University Medical Center. This research was funded by a collaboration of Zorgboog (Helmond / Bakel) and Oktober (Bladel). Lian started the CREATE study (Challenging REhAbiliTation Environment), which focused on a challenging rehabilitation environment in geriatric rehabilitation.

In December 2022, Lian stopped working as a physical therapist. Since then, she has combined her PhD research with the position of project leader for outpatient geriatric rehabilitation and Science Practitioner at Zorgboog. In this position she works on building bridges between science and practice, and she is affiliated with the University Knowledge Network for Elderly Care Nijmegen (UKON) of Radboudumc.

Lian lives in Uden with her partner Harm. They are expecting their first child in November.