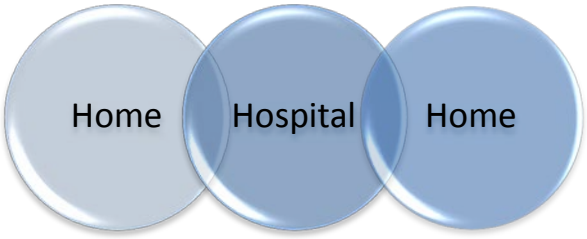
PhD Thesis

Physical performance and post-discharge rehabilitation of acutely admitted older adults



Inge Hansen Bruun
Department of Physiotherapy and Occupational Therapy, Lillebaelt Hospital &
Institute of Regional Health Research, University of Southern Denmark

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Academic advisors

Principal supervisor

Christian Backer Mogensen, Associate Professor, PhD, MD
Emergency Department, Hospital of Southern Jutland, Aabenraa, Denmark and Focused Research Unit in Emergency Medicine, Institute of Regional Health Research, University of Southern Denmark, Odense, Denmark

Co-supervisors

Berit Schiøttz-Christensen, Professor, PhD, MD
Spine Centre of Southern Denmark, Lillebaelt Hospital, Middelfart, Denmark and Institute of Regional Health Research, University of Southern Denmark, Odense, Denmark

Thomas Maribo, Associate Professor, PhD, PT
Department of Public Health, Aarhus University, Aarhus, Denmark and DEFACTUM, Central Denmark Region, Aarhus, Denmark

Birgitte Nørgaard, Associate Professor, PhD, MScN
Department of Public Health, University of Southern Denmark, Odense, Denmark

Assessment committee

Chairman

Jette Primdahl, Associate Professor, PhD
Kong Christian X's Gigthospital, Sygehus Sønderjylland and Institute of Regional Health Research, University of Southern Denmark

Assessors

Hans Lund, Professor, PhD
Centre for Evidence-based Practice, Western Norway University of Applied Sciences, Bergen, Norway

Thomas Andersen Schmidt, MD, DMSci, Head of Research, Coordinating Associate Professor, Chief Physician, Department of Emergency Medicine, Holbaek Hospital, University of Copenhagen; and Institute of Clinical Medicine, Faculty of Health and Medical Sciences, University of Copenhagen (Resigned from the assessment committee at the 09. of February 2018).

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"Lack of activity destroys the good condition of every human being while movement and methodical physical exercise save and preserve it"

Plato

List of papers

This thesis consists of

Paper I: Bruun IH, Mogensen CB, Nørgaard B, Schiøttz-Christensen B, Maribo T. Validity and responsiveness to change of the 30-second Chair Stand Test in older adults admitted to an emergency department. *J Geriatr Phys Ther* 2017;00:1-10. DOI: 10.1519/JPT.0000000000000166

Paper II: Bruun IH, Maribo T, Nørgaard B, Schiøttz-Christensen B, Mogensen CB. A prediction model to identify hospitalized, older adults with reduced physical performance*. Bruun et al. BMC Geriatrics (2017) 17:281.*

Paper III: Bruun IH, Maribo T, Nørgaard B, Jessen MGB, Schiøttz-Christensen B, Mogensen CB. Functional assessment and immediate rehabilitation: the effect on physical performance in acutely admitted older adults with reduced functional performance - a randomized clinical trial. *Submitted to Disability and Rehabilitation 30.12.2017*

Paper IV: Bruun IH, Norgaard B, Maribo T, Schiøttz-Christensen B, Mogensen CB. The effect on physical performance of a functional assessment and immediate rehabilitation of acutely admitted elderly patients with reduced functional performance: the design of a randomized clinical trial. *BMJ Open.* 2014;4(6):e005252.

Lists of abbreviations, tables, and figures

List of abbreviations

ADL: Activities of Daily Living

BADL: Basic Activities of Daily Living

DEMMI: The de Morton Mobility Index

IADL: Instrumental Activities of Daily Living

ICF: The World Health Organization's International Classification of Functioning, Disability and Health

30s-CST: The 30-second Chair Stand Test

ED: Emergency department

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Dansk resume

Evnen til at varetage daglige funktioner er væsentlig for at opretholde et selvstændigt liv med mulighed for at deltage i meningsfulde aktiviteter. For ældre med reduceret fysisk formåen betyder inaktivitet under sygdom og indlæggelse imidlertid en risiko for tab af selvstændighed. Efter en akut indlæggelse er ældre ofte trætte og har svært ved at finde overskud til fysiske aktiviteter, men ældre patienter kan på trods heraf vente i op til 14 dage på opstart af kommunal genoptræning.
Tidlig identifikation af de ældre patienter, som er sårbare overfor inaktivitet, vil give mulighed for mobilisering under og efter indlæggelsen.
I en akutafdeling er det primære fokus behandling af indlæggelsesårsagen, og som følge deraf er der mindre fokus på ældres fysiske formåen og behov for mobilisering under og efter en indlæggelse. Eksisterende screeningsredskaber til identifikation af ældre med risiko for fx funktionstab har vist sig at have begrænset prædiktiv evne. Funktionsevnen hos akutte patienter vurderes ofte ved hjælp af selv-rapporterede oplysninger, selvom objektive måleredskaber kan tilvejebringe væsentlige oplysninger om ældres nedsat fysiske formåen. Kombinationen af selvrapporterede oplysninger og objektive måleredskaber har desuden vist sig at være bedre end blot den ene. Eksisterende objektive måleredskaber, som er valideret til akut indlagte ældre medicinske patienter, som fx De Morton Mobility Index (DEMMI), er imidlertid vanskelig at anvende i en travl akutafdeling, da de kan være både tids- og pladskrævende. 30-sekunders rejse-sætte-sig-testen (30s-RSS) er let at anvende, idet styrken i benene vurderes ved blot at tælle antallet af gange patienten kan rejse sig fra siddende til stående position i løbet af 30 sekunder. Endvidere er 30s-RSS ≤ 8 et valideret skæringspunkt til identifikation af hjemmeboende ældre i risiko for tab af funktionel mobilitet.
Formålet med ph.d.-projektet var at identificere ældre med vedvarende nedsat fysisk formåen (30s-RSS≤ 8) efter en akut indlæggelse, samt at undersøge effekten af en systematisk funktionsvurdering i kombination med hurtig opstart af genoptræning.
Delmålene var 1) i forhold til DEMMI at undersøge gyldigheden af 30s-RSS-testen samt dens evne til at registrere ændringer over tid, 2) at identificere prædiktorer for hvilke ældre medicinske patienter, som efter akut indlæggelse har vedvarende nedsat fysisk formåen (30s-RSS≤ 8), og 3) at undersøge effekten af en systematisk funktionsvurdering og/eller hurtig opstart af kommunal genoptræning hos akut indlagte medicinske patienter med nedsat fysisk formåen på indlæggelsestidspunktet. Den systematiske funktionsvurdering, som blev udført indenfor de første 48 indlæggelsestimer, havde til formål at identificere ældre, som har eller er i risiko for tab af funktionel mobilitet. Den vil endvidere tilvejebringe fysiske og funktionelle informationer, danne basis for mobiliseringsanbefalinger og vurdering af behovet for genoptræning efter indlæggelsen. Effekten blev vurderet ved 30s-RSS målt 3 uger efter indlæggelsestidspunktet.

Projektet bestod af *tre studier*, hvoraf de to, et valideringsstudie og et prædiktionsstudie, var baseret på en prospektiv kohorte, mens det tredje studie var udformet som et 2 x 2-faktorielt randomiseret klinisk interventionsstudie. I interventionsstudiet blev vanlig vurdering og systematisk funktionsvurdering kombineret med vanlig genoptræningsstart og hurtig genoptræningsstart. Inklusionskriteriet var: akut indlagte medicinsk patienter over 65 år. Prædiktions- og interventionsstudiet inkluderede kun patienter, der højst kunne gennemføre 8 repetitioner i 30s-RSS.

Resultatet af valideringsstudiet var, at patienter med lav fysisk formåen (30s-RSS ≤ 8) i sammenligning med patienter med høj fysisk formåen (30s-RSS > 8) har et statistisk signifikant større behov for hjæp til dagligdags aktiviteter, at 30s-RSS er anvendeligt til vurdering af akut indlagte ældres fysisk formåen, samt at 30s-RSS, sammenlignet med DEMMI, har ringere evne til vurdering af ændringer over tid, især hos ældre patienter med nedsat fysisk formåen.
Prædiktionsstudiet viste, at høj alder (85+ år), hunkøn, anvendelse af ganghjælpemiddel og en 30s-RSS-score ≤ 5 kan identificere 78% af de akut indlagte ældre patienter med vedvarende nedsat fysisk formåen (30s-RSS ≤ 8).
I interventionsstudiets viste analysen, baseret på hvad patienterne var randomiseret til (intention-to-treat), ingen signifikant forskel mellem grupperne. Der fandtes ligeledes ingen signifikant forskel mellem vanlig vurdering og systematisk funktionsvurdering, eller mellem vanlig og hurtig genoptræningsstart. Undersøgelse af hvorvidt patienterne havde modtaget den ved randomiseringen tildelte ydelse viste, at 99% af patienterne havde modtaget den tildelte funktionsvurdering. Der blev ikke indsamlet data vedrørende omfanget af mobilisering under indlæggelsen, og begrænset implementering af mobilisering kan være en betydende fejlkilde. En undersøgelse af tidspunktet for opstart af genoptræning viste, hvis hurtig genoptræningsstart defineres som indenfor 5 dage, at 48% af patienterne havde fået hvad de var randomiseret til. Som følge heraf er manglende overholdelse af protokollen en betydelig fejlkilde.

Konklusion: Valideringsstudiet viste, at 30s-RSS-testen er et anvendeligt måleredskab til akut indlagte ældre medicinske patienter. Prædiktionsstudiet viste, at en 30s-RSS-score ≤ 5, kombineret med selvrapporterede oplysninger, kan identificere størstedelen af ældre patienter med vedvarende nedsat fysisk formåen (30s-RSS ≤ 8) efter en akut indlæggelse. Interventionsstudiet kunne ikke påvise, at systematisk funktionsvurdering og/eller hurtig genoptræningstart har positiv effekt på ældres funktionsevne, når dette vurderes 3 uger efter indlæggelsestidspunktet ved test med 30s-RSS.

Summary

The ability to perform everyday activities is essential to maintain an independent lifestyle and participate in meaningful activities. However, for older adults with reduced physical performance, inactivity during illness and hospitalization pose the risk of loss of independence. In older adults, acute admission is often followed by tiredness and inactivity, but in spite of this, older adults may have to wait for up to 14 days initiatiation of post-discharge rehabilitation.

Early identification of elderly patients prone to inactivity will allow for their mobilization during and after the hospital stay.

In the short-stay unit located in an emergency deparment the focus is primarily on treating the presenting illnes; as a consequence, older adults' physical performance and need for mobilisation during and after the hospital stay receives less attention. Existing screening tools for identifying older adults at risk of adverse outcome, e.g., functional decline, have shown poor predictive ability. A functional assessment of acutely admitted older adults is conventionally based on self-reported information, although physical performance measurement are known to provide important information on older adults' physical ability. The combination of self-reported information and physical performance measurement has proved to be better than either on its own. Existing physical performance measurement tools validated for acutely admitted older adults, such as the De Morton Mobility Index (DEMMI), are difficult to use in a busy short-stay unit, since they require time and space. The 30-second Chair- Stand test (30s-CST) is easy to use, as lower body strength is assessed by counting the number of times the patient is able to rise from sitting to standing position within 30 seconds. A 30s-CST score ≤ 8 is a validated cut-off point for identification of community-dwelling older adults at risk of loss of functional mobility.

This PhD project aimed to identify older adults with persistent reduced physical performance after acute admission, and examine the effects of functional assessment on physical performance, when combined with immediate rehabilitation.

The objectives were 1) when compared to DEMMI to examine the validity of the 30s-CST and its ability to detect changes over time; 2) to identify older adults with persistent reduced physical performance (30s-CST ≤ 8), following acute hospitalization, and 3) to examine the effect on physical performance of a systematic functional assessment in the short-stay unit of older adults with reduced physical performance, when combined with immediate rehabilitation. The functional assessment, which was performed within the first 48 hours of admission, aimed to identify those with a loss of functional mobility, or at risk thereof. It further provides information on physical and functional issues, and forms the basis of recommendations on mobilization and assessments of the need for post-discharge rehabilitation. The effect was assessed using the 30s-CST three weeks after admission.

The project consisted of three studies, of which two, a validation and a predictive study, were based on a prospective cohort study and one on a two-way factorial randomized clinical trial. In the latter, usual assessment and systematic functional assessment were combined with usual rehabilitation and immediate rehabilitation. For inclusion the patients had to be 65 years or older and acutely admitted for 'medical' reasons. The prediction study and the clinical trial, however, included only patients who were able to perform no more than eight repetitions in the 30s-CST.

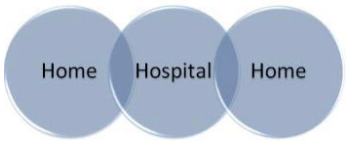
Results: The validation study demonstrated that patients with low physical performance (30s-CST ≤ 8), compared to patients with high physical performance (30s-CST > 8), had a significantly higher need for help with activities of daily living (ADL). The 30s-CST was demonstrated to be acceptable for assessing the physical performance of acutely admitted older adults. Compared to DEMMI, however, the 30s-CST demonstrated poorer ability to assess changes over time, especially in older adults with low physical performance.

The predictive study showed that advanced age (85 years or more), female gender, walking aid use, and 30s-CST score ≤ 5 enabled the identification of 78% of older adults with persistent reduced physical performance following acute hospitalization (30s-CST ≤ 8).

In the clinical trial the analysis based on the randomized groups (intention-to-treat) showed no significant difference in effect when the four groups were compared. Nor was any significant difference found when usual assessment was compared with systematic functional assessment, or when usual rehabilitation was compared with immediate rehabilitation. An examination of the patients' assessments demonstrated that 99% of the patients received the functional assessment they had been assigned to. As no data on the degree of mobilization in the hospital were collected, poor implementation may be a significant source of error. An examination of rehabilitation, with immediate defined as within five days, showed that 48% of the patients had received the designated intervention. As a result, failure to comply with the protocol was another significant source of error.

Conclusion: The validation study demonstrated the 30s-CST was a valid instrument for physical performance measurement in acutely admitted older adults, and that a 30s-CST score ≤ 5, combined with self-reported information, is capable of identifying the majority of older adults with persistent low physical performance after discharge (30s-CST ≤ 8). The clinical trial failed to demonstrate a positive effect of systematic functional assessment and/or immediate rehabilitation on older adults' physical performance when this was assessed using the 30s-CST three weeks after hospitalization.

1. Introduction



The population is ageing all over the world. In high-income countries, the increased life expectancy is caused primarily by reduced mortality rates among the elderly citizens (1). The global average life expectancy was 50 years in 1960 and is expected to rise to 76 years in 2050 (2). In Denmark, life expectancy has increased from 77.9 years in 2005 to 80.6 years in 2015, while the number of citizens older than 80 years of age has increased by 71 % from 1980 to 2016 (2,3).

From the age of 60, the burden of age-related physical losses increases, with structural and functional deterioration occurring in most physiological systems. This implies a reduced physical reserve capacity and a risk of physical and functional decline, a deterioration that raises the risk of acquiring chronic diseases (4). At the societal level, the increased number of older adults and its possible implications for health and care systems are causing concern about public expenditure (5). Older adults form a heterogeneous group, as the impact of ageing varies, ranging from those who are independent and active, participating in meaningful activities, to those who are frail and depend on help with activities of daily living (ADL).

In Denmark, 65%–75% of men and women over 60 years of age can walk 400 meters or climb stairs without difficulties, indicating a relatively high functional ability, but 13% of the elderly Danish population (65 years of age or older) receive in-home help for an average of 3.6 hours weekly (6,7), indicating problems in functioning. Briefly, functioning is an umbrella term for body function, activities, and participation (see Section 1.6).

The ability to perform ADL and maintain an independent lifestyle with participation in meaningful social activities is as essential for older adults as for the population in general (8), but hospitalization and inactivity pose risks of loss of independence for the former group. A hospital stay almost inevitably means an inactivation for the patient (9). While young patients quickly regain their physical ability, for older adults with reduced physical reserve capacity, the inactivity during even a short hospital stay is significantly associated with onset or additional loss of the ability to perform ADL (10-17). Older adults are characterised by frailty and comorbidity, however even if this is not the case inactivity contribute to reduced physical performance (14,18,19)

The trend towards establishing short-stay units in emergency departments (ED) has increased the number of patients discharged after a short admission and thus the need for cooperation and coordination with the primary sector on follow-up and care at home (20). Having two organizational levels of health and care service delivery (regional and municipal), each characterized by its own theoretical and organizational goals, presents a number of challenges to the care of older adults (21). The short-stay unit offers new opportunities regarding the identification and assessment of acutely admitted older adults with reduced physical performance. Although physical performance

measurement tools have been developed for this purpose, few of them are validated for use in acutely admitted older adults, and those who are validated, such as the de Morton Mobility Index (DEMMI), require ample floor space and/or are time-consuming (22-24). Moreover, the existing screening tools for identification of older adults at risk of adverse outcome have demonstrated poor predictive ability (25,26)

In relation to these challenges, this project had three overall aims:

- to validate the 30-second Chair- Stand Test as an physical performance measurement tool for use in acutely admitted older adults.
- to identify potential predictors for detecting older adults with persistent reduced physical performance after acute admission.
- to assess the effect on physical performance of a systematic functional assessment performed at admission combined with immediate rehabilitation in older adults with reduced physical performance.

The introduction section describes the ageing process, the consequences of inactivity, existing knowledge about functional assessment, and different ways of assessing the ageing population. This is followed by a description of the effect of physical activity and exercise and an introduction to rehabilitation. The introduction concludes with an overview of various perspectives on rehabilitation in the Danish health system.
The Methods, Results, and Discussion sections follow the Introduction.

1.1. The ageing process

An ageing population is characterized by the increasing prevalence of chronic pathologies largely attributable to the loss of functioning (27). Even in the absence of overt disease, ageing implies a loss of heart and skeletal muscle, leading to a decline in physical reserve capacities and 'safe margins' (27,28). Furthermore, aerobic exercise capacity is reduced by changes in the cardiovascular system (28,29). Besides the loss of skeletal muscle mass, which is strongly associated with the loss of strength, the ageing process is characterized by a decline in muscle protein synthesis, an accelerated loss of fast fibres, and the loss of motor units—changes that result in a greater proportion of slow muscle fibres (30-34). This process is usually followed by increasing difficulties with activities such as the climbing of stairs and rising from a chair (28,31,35). In older adults with reduced physical reserve capacity, an additional loss of strength can have serious physical and functional consequences, since functionally impaired older adults use as much as 97% of their available strength to rise from a chair (36).

However, ageing does not necessarily denote a steep downward curve in functioning. In older adults, the frequent transitions between states of independence and need for personal assistance with walking or climbing stairs illustrate a highly dynamic process (37), which not only affect mobility but also the need for help with ADL and stages of frailty (38,39). In newly disabled community-dwelling older adults, recovery rates as high as 80% have been demonstrated in regaining independence in bathing, dressing, walking, and transferring from a chair (40).

If low muscle mass, and low muscle strength or low physical performance are present, the condition is labelled sarcopenia, an independent condition according to the International Classification of Disease (Tenth Revision, Clinical Modification Code) (41,42). Many older adults who exhibit sarcopenia are frail, which is a condition often defined by the presence of at least three of the following: weight loss, exhaustion, low physical activity, muscle weakness, and slow walking speed (41,43).

1.2. Inactivity and physical or functional decline during hospitalization

Several studies have documented that hospitalized older adults spend the majority of time in bed, only walking or standing for 43–83 minutes daily (44-48). With older adults in particular, inactivity must be avoided, as this has been shown to be directly related to functional decline at discharge and at one-month follow-up (49).

Studies concerning the consequences of inactivity have primarily been performed on healthy older adults. For this group, a 75% reduction over two weeks in the number of steps taken per day results

in a significant loss of muscle mass (50); in older adults with reduced physical performance, a total hospitalization period of eight days or more per year leads to a significant loss of strength compared to nonhospitalized older adults (51).

It is well known that bedrest and low physical activity lead to a loss of muscle strength, loss of aerobic capacity and functional decline (18,52). It moreover appears that impairment progresses relatively fast over the first days of inactivity and that after just four days of disuse or immobilization followed by seven days of recovery, the decrease in mechanical muscle function becomes permanent in older adults (53-55).

Between 35% and 46% of older adults report having detected a decline in their functional capability two weeks before hospitalization (56-59)**.** For older adults whose functional decline has begun before hospitalization, as well as those unable to complete a physical performance test at admission, a lower level of mobility during hospitalization have been demonstrated (19,44). Conversely, patients discharged with a new or additional need for help with ADL have considerably worse outcomes than those who have returned to their baseline status (60). After a hospital stay, 30%– 50% of older adults report a decline in ADL (19,49,56-58,60,61).

For acutely admitted older adults, even short-term inactivity poses a risk of loss of independence, which makes early identification essential as it allows for targeted interventions, such as mobilization.

1.3. Functional assessment

With ordinary patients, the importance of functional status assessment is widely recognized (62). In admitted older adults (≥ 60 years of age), age, gender, and diagnosis, have been shown to be only one among several factors affecting outcome (62). Functional status at admission has demonstrated to affect mortality, discharge destination, length of stay (LOS), and readmission rates (62). Similar result was found for patients ≥ 75 years of age; gender and age appears not to be determining factors for readmission, however functional dependence is a risk factor (63).

In traditional patient care, the functional assessment is carried out within the first week of hospitalization or at time of medical stabilization (62). For older adults discharged from the short-stay unit, functional assessment should be performed at an earlier time. Organizational changes following from the establishment of short-stay units in emergency departments have provided an opportunity for interdisciplinary assessment of older adults admitted for less than 72 hours. However, the effect of functional assessment of this group has not been documented. For this thesis, a systematic search for studies of the effect of a functional assessment of such patients was performed in the following databases: PubMed, CINAHL, EMBASE, Cochrane, and PEDro (further

details in Appendix A). No studies of functional assessment in acutely older adults admitted for less than 72 hours were identified in the search.

Below follows a short description of areas identified through the literature search.

Comprehensive geriatric assessment

In acutely admitted older adults who receive a comprehensive geriatric assessment (CGA) rather than general medical care has proven to have several advantages, for instance, less likely to suffer deterioration at six-months follow-up (64,65).

The CGA is a multidisciplinary tool with cognitive and mood evaluation, examination of comorbidity and polypharmacy, assessment of falls and functional status as well as nutritional status and social support (66). Studies on CGA typically include medical patients ≥ 70 years of age, or patients 65 years of age or older, which also comply with other screening criteria or functional problems (67). No clear benefits of CGA on frail patients discharged from the acute hospital within 72 hours have been found (68). CGA has moreover been shown to be too time-consuming for general use in older adults admitted to the short-stay unit (66,69).

Screening tools for adverse outcome and need for a comprehensive geriatric assessment

The time-consuming CGA has stimulated development of screening tools for identification of older adults at risk of adverse outcomes, such as nursing home admission, readmission to hospital, functional decline, and mortality (66). The screening tools that have been tested in the acute setting have demonstrated poor predictive ability; moreover, they were all based on self-reported information (25,69). The most used tool, Identification of Senior at Risk (ISAR), has demonstrated poor accuracy in predicting functional decline or other adverse outcomes (25,70).

Furthermore, risk factors such as age and dementia have proven to be unable to predict adverse outcome in an ED setting (25).

Frailty rating scales

Frailty scales, which are used to identify those older adults who are most vulnerable to adverse health outcomes, including functional decline, have demonstrated poor predictive ability in acutely admitted older adults (25,26,71). Frailty scales often include one or more of the conditions related to frailty e.g. weight, exhaustion, low physical activity, muscle weakness, and slow walking speed (26).

Functional decline is often assessed through the Barthel, which measures activities of daily living, such as bathing, transfer, and indoor mobility, moreover usually using self-reported information (26).

Functional assessment

In addition to helping ascertain problems with function, a functional assessment aims to alert clinicians to the need for preventive interventions against further decline and to aid discharge planning (72). Nevertheless, during the first 48 hours of acute care, there is considerable risk that physical and cognitive functions are overlooked (72). Furthermore, mobility regimes tend to be initiated shortly before discharge (72). The functional assessment usually includes self-reported information on the need for help with basic activities of daily living (BADL), such as bathing and dressing, or help with instrumental activities of daily living (IADL), e.g., shopping and cleaning (73,74). However, the functional assessment is not systematically documented (72,75); 40%–60% of nurses' reports, and 80%–97% of physicians' reports, offer no information on BADL; documentation on IADL is even more sporadic (76,77).

Multidisciplinary interventions are described as beneficial, in particular for older adults across all care settings, as they complement medical and nursing efforts by providing physical, functional, and psychosocial support of older adults (78,79).

The abovementioned findings support the results of our study of the short-stay unit (80), for which we interviewed the health staff in the short-stay unit and in the departments receiving older adults from the short-stay unit (80). In their experience, physiotherapists' assessments led to earlier mobilization and recommendations for mobilization (80). The physicians likewise spoke of the importance of data collected by observing the older adults during walking or performing ADL (80). For staff in departments receiving patients transferred from the short stay unit, the recommendations on mobility were seen as helpful since they enabled a faster start-up after the relocation (80).

Specialized geriatric units

For older adults, admission to a short-stay unit is often followed by transferal to a geriatric unit. A meta-analysis of studies that included all parts of the so-called ACE model (Acute Care for Elders) (involving patient centered care, frequent medical reviews, early rehabilitation, early discharge planning, and prepared environment) has indicated that older adults receiving acute geriatric care were 13% less likely to experience functional decline (81).

Multidisciplinary teams – allied health

Evaluation studies of multidisciplinary teams in the ED have focused on their effect on discharge planning, readmission rates, and preventing unnecessary hospital admission for patients attending the ED (82-84). An assessment of functional needs and potential barriers to discharge of medical and surgical patients showed no effect on LOS (85).

The literature search showed that within the first 48 hours of admission, nurses and physicians focused on treating the presenting illness while physical function received scant attention. Functional

assessment was normally based on self-reported information. Studies show poor predictive ability of existing screening tools.

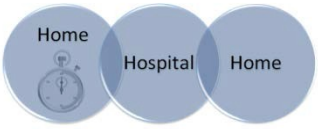
1.4. Assessing the ageing population

1.4.1. Self-reported information

In acute hospital settings, self-reported information on need for help with activities of daily living is the most frequently used assessment tool (72,74). Although self-reported information provides useful information on the older adult's habitual performance, older adults often overestimate their own capability to perform a specific task (86-89). A study of such patients presenting to an ED has thus demonstrated a 12%–48% discrepancy between self-reported and tested ability to perform a simple mobility task (90). Discrepancies have also been found among hospitalized older adults and community-dwelling older adults (88,91).

Moreover, the data offered by self-reported information and physical performance measures cover only partly identical aspects of functioning (92), inasmuch as the former also reflect the respondent's experience and expectations of, e.g., a gradual loss of function. Comparison with their peers' level of functioning may also influence the assessment towards an age-appropriate average (89-94). Since self-reported information and physical performance measures cover different parts of functioning, a combination of the two has shown to be better than either of them alone (95,96).
A further weakness of self-reported physical performance assessments stems from the fact that physical impairment is typically not detected until the older adult need help with ADL (97).

1.4.2. Physical performance measurement tools for acutely admitted older adults

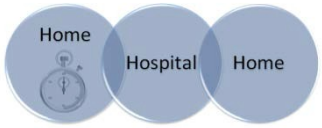


Physical performance tests have been recommended for systematic use in acutely ill patients (98,99).
With acutely ill, medically unstable older adults (at least 65 years of age) gait speed has demonstrated the ability to provide important information for the detection of physiological decline as a precursor to loss of function (24) Gait speed has also demonstrated an association to LOS, home discharge, and health-related services (24,99,100). Gait speed requires a walking distance of 2.5, 3 or 4 meters (24,101). The Short Physical Performance Battery (SPPB) has been shown to be a feasible and valid indicator of functional status in acutely admitted older adults (65 years of age or older)(23,102). The SPPB includes three different tests; balance, gait speed, and five times Chair Stand test. The multi-item De Morton Mobility Index (DEMMI) is another physical performance measure validated for acutely admitted medical patients. The 15-item index measures mobility and balance across the spectrum from bed-bound to

independent mobility, the latter involving a walking distance of 50 meters (22). Moreover, it takes about 10-15 minutes (103).

In acutely admitted medical patients, physical performance measurements have shown improvement during hospitalization (23,104). Nevertheless, most patients with poor physical performance at admission continue to have poor performance at discharge (104).

1.4.3. Physical performance measurement tools for the community-dwelling older adults



Objective and standardized physical performance measures have been used for decades to assess community-dwelling older adults' functioning (86,105). It is well established that impairment usually leads to reduced physical performance and functional decline (106-109). The use of physical performance measures has revealed that gait speed, sit-to-stand test scores, and balance tests can reliably predict inability to perform mobility-related tasks, institutionalization, and morbidity (110-112). Moreover, the use of a single-item test of gait speed, or the sit-to-stand tests, has been shown to be almost as effective as the use of complete performance batteries, such as the Short Physical Performance Battery (SPPB) (87,105,112,113).

The 30-second Chair Stand test (30s-CST) is part of the Senior Fitness Test (SFI), a battery based on the assumption that a physically inactive lifestyle is the cause of frailty in later years (114,115).
The 30s-CST assesses lower body strength by counting the number of stands completed in 30 seconds with the hands crossed against the chest (115) (Figure 1). Lower body strength has been shown to be associated with older adults' mobility and need for help with ADL (108-110,112). An essential factor as functional mobility is a health outcome of high priority among older adults as for the population, in general (8). In addition, the 30s-CST is easy to perform in a short-stay unit and in the older adults' home.

In active community-dwelling older adults older than 60 years of age, a 30s-CST≤ 8 cut-off point is capable of identifying those at risk of loss of functional mobility (114). The mentioned cut-off point is validated by comparing with self-reported information on BADL and IADL (114,116).
Moreover, the 30s-CST≤ 8 is recommended by the Danish Health and Medicines Authority for the systematic identification of older adults at risk of reduced physical functioning (101).The 30s-CST and the DEMMI are both used in the Danish National Database of Geriatrics. Only the latter has been validated for hospitalized older adults (22,117-119).

Furthermore, a 30s-CST score ≤ 5 has been used to identify older adults in need of further medical assessment due to a risk of sarcopenia (120). In community-dwelling older adults, an association has been demonstrated between, on the one hand, a lengthening in time to perform the CST five times,

or the inability to rise with hands crossed against the chest and, on the other hand, a higher probability of functional limitations and dependence in BADL (108,109,121).

Figure 1. The 30-second Chair-Stand test

The 30s-CST is an easy-to-use physical performance measurement tool. It is currently not validated for use in acutely admitted older adults.

Until now, the assessment of acutely admitted older adults' need for help with ADL has relied on self-reported information. It is now, however, well documented that physical performance measures are useful for the assessment of acutely ill patients, and that they have predictive ability. Among community-dwelling citizens, the 30s-CST ≤ 8 has the ability to identify those at risk of loss of functional mobility.

1.5. Physical activity and physical exercise during and after hospitalization

A strict distinction between physical activity and physical exercise is hard to maintain, as the former is defined as body movement involving the contraction of skeletal muscles and an increase in energy expenditure, as e.g., when performing household chores, walking, and other ADL (4,122). Physical exercise refers to planned, structured, repetitive movement aimed at improving or maintaining one or more components of physical fitness (4).

A study of hospitalized patients who walked for up to 20 minutes twice a day supervised by an assistant has shown an increase in the number of patients discharged to their own home. In this study, a physiotherapist provided a gait and balance assessment, reviewed the importance of daily walking, and provided assistive devices if needed (123).

A large number of studies of either multidisciplinary programmes with an exercise component, or individually tailored physical exercise interventions aimed at hospitalized 'medical' older adults, were assessed in three review studies (124-126). The multidisciplinary programmes' exercise components were vaguely described; but the individually tailored physical exercise interventions included weekly mobility, balance, and resistance strength training (124-126). The reviewed studies that assessed ADL found significant improvement in functional capacity, whereas the studies assessing physical performance showed contradictory results (124-126). The studies combining either exercise and

education during the hospitals stay or post-discharge follow-up were able to report improvements in ADL (124-126).

Two studies of post-hospitalization training have demonstrated significantly improved physical performance in older adults recruited during hospitalization for a training programme initiated one week after discharge. One of the studies compared self-training to supervised training; in the other study, high-intensity aerobic exercise was compared with low-intensity exercises (127,128). Participation was declined by 14% of those contacted for the study of supervised training, whereas the number of refusals was 60% in the case of the study of high-intensity versus low-intensity exercise (127,128).

Regarding short-term hospitalization, it is interesting that the majority of in-hospital exercise interventions typically started 2–3 days after admission (124,126,129). In a feasibility study on progressive strength training, 43% of the subjects were excluded, as they were discharged within the first 24 hours of admission (130). Another study also showed recruiting difficulties due to early discharge or patients' unavailability (131). Furthermore, adherence to physical exercise is evidently challenged by illness severity or patients refusing on grounds of "feeling unwell", "not in the mood", or a "lack of energy" (131,132). The mentioned results indicate a number of obstacles to the introduction of exercise during admission to a short stay unit, thus accentuating the need for mobilization

After an acute admission, older adults commonly experience tiredness and find it difficult to mobilize energy for physical activity (133,134). With regard to exercise training following a period of disuse, older adults generally show low adherence to non-supervised, structured resistance-type exercise (55). Lastly, older adults should not be expected to initiate physical activity or exercise by themselves (135).

Based on the aforementioned results, it appears that mobilization during hospitalization and post-discharge follow-up is the most relevant measure to support retention of lower body strength during and after hospitalization.

With regard to physical decline after hospitalization, a meta-analysis of community-dwelling older adults with limited mobility has demonstrated a positive effect of physical exercise on mobility and physical functioning (136). Other reviews and meta-analyses, involving older and very old individuals, have demonstrated a robust significant association between resistance exercises and upper and lower body strength, which is taken as indication that resistance exercise can help older adults maintain independence (4,137-139). Moreover, a relatively low number of high-force contractions activating high-frequency muscle fibres appear to act as an effective countermeasure to the loss of muscle strength and muscle power (30).

Mobilization implemented as a part of the normal day-to-day programme offers the opportunity to be carried out when patients are available. This is an essential concern, since short-term hospitalization typically involves frequent testing and medical procedures. Post-discharge follow-up and supervised training after acute hospitalization have been demonstrated to improve performance in ADL.

1.6. Rehabilitation

Within the first 48 hours of admission to the short stay unit, focus is usually on diagnosis and treatment of the illness (72) – a focus based on the biomedical model. In rehabilitation, the focus is on functioning. According to the International Classification of Functioning, Disability, and Health (ICF), functioning is an umbrella term encompassing all body functions, activities and participation working in a dynamic interaction between health conditions (diseases, disorders, injuries, traumas, etc.) and contextual factors. In Denmark, there is no clear consensus on the definition of rehabilitation.

In the guidelines for physical rehabilitation and rehabilitation services in municipalities and regions, stipulated by the Health Act and the Social Services Act (henceforth Guidelines) (140), rehabilitation is defined as "…goal-oriented, fixed-term courses of coordinated benefits and services offered within the areas of health, social affairs, employment, and education services aiming at the regaining of former, or best possible, functioning in order for the citizen to live the most independent and meaningful everyday life possible" (140). This definition is used in the thesis.

At the time of admission to the short-stay unit, assessment on activities and body functions is prioritized; at time of discharge, focus should be on the three components in functioning and the interaction with contextual factors. As the assessment in this thesis is close to time of admission, the focus of assessment are body function (lower body strength) and activities (sit-to-stand).

Functioning, described in ICF terms, plays a role regarding the division of responsibility for rehabilitation between the primary and secondary sectors in Denmark. The ICF also provides the framework for the referral document between the sectors (140). ICF is a biopsychosocial model of functioning focusing on the impact of disease or health condition (141) (Figure 2).

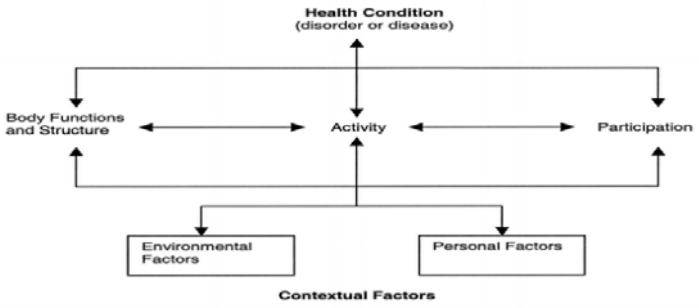


Figure 2. The ICF model; World Health Organization (142)

The physiological functioning of the body system is termed body function, with such components as balance and lower body strength. Body structure refers to anatomical aspects. Activity is defined as the individual's execution of a task or action—e.g., rising with hands crossed against the chest; the individual's involvement in a life situation is termed participation (143).
Disability is an umbrella term for decrement, causes by impairment, activity limitation, and participation restrictions, etc. (93).
As shown in Figure 2, the ICF model also includes contextual factors: Environmental factors are defined as the physical, social, and attitudinal environment in which people live and conduct their lives—e.g., the use of assistive devices (93). Personal factors refer to the individual's life background and current conditions, such as living arrangements (143).
Use of the ICF model ensures that attention is given to resources as well as to limitations (142,143). Moreover, the ICF model is a dynamic model of functioning and disability. As illustrated by the arrows in Figure 2, all components affect each other mutually, disability can thus emerge from all components and is always the result of interaction between the features of the person and the context in which a person lives (144).

However, it is important that a holistic assessment does not prevent focusing on individual components, such as body function or health conditions. Ageing is an important health condition, especially where older adults make up a large proportion of patients, as in short-stay units (145).
In this thesis, ageing, inactivity and post-discharge rehabilitation needs are central; however, disability is always the result of interaction between functioning and contextual factors. In the short-stay unit, an assessment including all ICF components - is to be done, when discharge and post-discharge rehabilitation are planned.

1.7. The Danish Health system

The Danish healthcare system operates across the following three levels: the state (policymaking; Ministry of Health), the regions (secondary sector; hospitals), and the municipalities (primary sector; communities).
In accordance with the Danish Health Act, the health services (secondary sector-level) aim to promote health and prevent and treat diseases, disorders, and disability (146). In accordance with the Social Services Act (primary sector-level), one of three goals is to meet the needs arising from impaired physical or mental function in order to promote individuals' ability to take care of themselves or to facilitate ADL and improve quality of life (147). Moreover, assistance should consistently be based on concrete and individual assessment of the individual's needs and preconditions, and take place in collaboration with the individual (147).

The general practitioner (GP) plays a key role in the contact between the primary level and the specialized healthcare system (3). The numbers of transitions between the primary and secondary sectors are on the rise because of the ageing population, the increasing number of chronically ill patients and the trend towards short hospital stays (20) .

Transitional care is defined as a set of actions designed to ensure the coordination and continuity of healthcare as patients transfer between different locations or different levels of care within the same location (148). Yet, coordination and continuity in transitions is challenged (21). One reason may be different priorities among the health staff within the secondary and primary sectors. For example, hospital nurses find it important to pass on information on ADL while nurses in home healthcare prioritize receiving information on medical problem/diagnoses (149).

Studies have demonstrated heterogeneity in interventions offered to older adults who are discharged from EDs, or in the planning and support given at discharge from other departments (134,150). However, there are several indications that effective interventions regarding older adults should include the structuring and reconciliation of discharge information and better coordination of follow-up care (148,151,152). However, there is no evidence that discharge interventions (discharge planning or support) have an impact on patient physical status at 3 or 6 month after discharge (152,153).

Even though multidisciplinary teams are included in some of the aforementioned discharge interventions, their lack of impact on physical status may be explained by a poor focus on activation of older adults after hospitalization.

1.7.1. The secondary sector in relation to older adults in need of post-discharge rehabilitation

In the secondary sector, the theoretical and organizational aims are the prevention and treatment of diseases, disorders as stipulated by the Health Act (146). The biomedical model, which predominates in the hospital setting, views disability as caused by a disease or pathology (141). Hence, in the biomedical model the focus will be on diagnosis and disease.

The Health Act stipulates post-discharge rehabilitation to begin in hospital and continue in the municipality at discharge and the information is passed on by a referral on post-discharge rehabilitation (140,146). The Health Act describes the aim of post-discharge rehabilitation as the regaining of former, or the best possible, functional abilities related to body functions and activities (see Figure 2 in section 1.6)(146). In accordance with the Guidelines, post-discharge rehabilitation must relate to the specific cause of hospitalization (140). This requirement seems to find support in the linear biomedical model that sees the disease as the cause of disability and need for post-discharge rehabilitation. However, in acutely admitted older adults, the diagnosis does not

necessarily identify those in need for post-discharge rehabilitation, since their need for rehabilitation often relates to functioning.

As stipulated by the Health Act, the post-discharge referral for rehabilitation must ensure targeted, continuous, and effective rehabilitation of patients, and pass on relevant and timely information (140). It must be given to the patient no later than at discharge (140), giving a description of present functioning, e.g., diagnosis, body function, activity, participation, and contextual factors.

A referral on post-discharge rehabilitation must relate to the specific cause of hospitalization; yet the referral must cover all aspects of the ICF model. Potential conflict arising from this may be due to the different perspectives on rehabilitation held by the primary and secondary sectors. This issue is described in the next section.

1.7.2. The primary sector and older adults in need of rehabilitation

The primary sector are responsible for various health and social services, including home care services for older adults who are unable to manage everyday life on their own (3). The local authorities also offer rehabilitation to discharged hospital patients and to all citizens in need under programmes constituted either by the Health Act or the Social Services Act (3,140).

Rehabilitation commenced during hospitalization is co-financed by the municipalities (3). At discharge, responsibility is passed on to the primary sector, which performs an individual assessment of the citizen's rehabilitation needs and formulates goals in collaboration with the older adult. Post-discharge rehabilitation may involve planned and structured physical exercise, self-training, and physical activity—including household chores and walking (140).

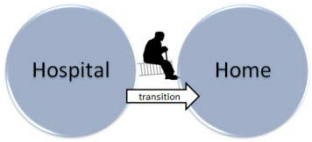
Primary sector operators are required to coordinate the different services offered to the citizens (140).

The rehabilitation services provided according to the Social Services Act are offered according to functioning (147). Their aim is to ensure the possibility of maintaining an independent lifestyle and participation in meaningful social activities as these relate to body function, activity, and participation (147). Contextual factors, such as the possibility of receiving help from spouse, assistive devices, etc., are also considered (147). Services according to the Social Services Act can be requisitioned only by actors in the primary sector, such as the GP or the home care services. Restorative care is another rehabilitation service offered by the municipalities, provided solely to older adults with new or additional need of personal help (147).

The Social Services Act provides for older adults to be offered services according to functioning. In principle, an acutely admitted older adult who is hospitalized due to an infection does not qualify for

referral to post-discharge rehabilitation, even though the inactivity occasioned by the illness poses a risk of loss of independence.

1.7.3. Transitions



The time limit for the initiation of post-discharge rehabilitation is determined at the discretion of the regional and the municipal authorities (140). In the studied region, the regulations prescribed that post-discharge rehabilitation must be initiated within 14 days of the municipality's receipt of the referral (154,155). At a national level, 2015 figures indicate that post-discharge rehabilitation based on the Health Act was initiated within 14–16 days (156). The duration of rehabilitation services is decided by the providing local authorities.

While for most young people a two-week wait for post-discharge rehabilitation would pose no problem, the same time places older adults at risk of inactivity after an acute hospitalization and thus at risk of loss of muscle strength.

1.8. Introduction summary

Inactivity among acutely admitted medical older adults is associated with functional decline, especially for older adults with reduced physical reserve capacity (14,18,19,49,52); early identification is therefore important for those prone to inactivity.

The short-stay unit primarily focuses on treating illness, with less attention to patients' physical function; i.e., mobilization and rehabilitation needs risk being underprioritized (72). In general, functional assessment in the short-stay unit is based on self-reported information on ADL (72,74), despite the demonstrated fact that physical performance measures can provide an indication of physical and functional status (23,24). However, measurement of physical performance in short-stay units is challenged, as this requires floor space and may be time-consuming (22-24,99). A combination of self-reported information and physical performance measures has been recommended (24,95,96). Furthermore, existing screening tools (frailty constructs and risk assessment) have demonstrated poor predictive ability (25,26).

Older adults often experience tiredness after acute hospitalization, and support in becoming physically active is needed (133-135). Nevertheless, even though a referral is sent from the hospital at time of discharge, initiation can be delayed for up to 14 days (140).

The 30s-CST is easy to use but has not been validated for acutely admitted older adults with medical problems. The use of physical performance measures in short-stay units is expected to be stimulated if the 30s-CST were validated.

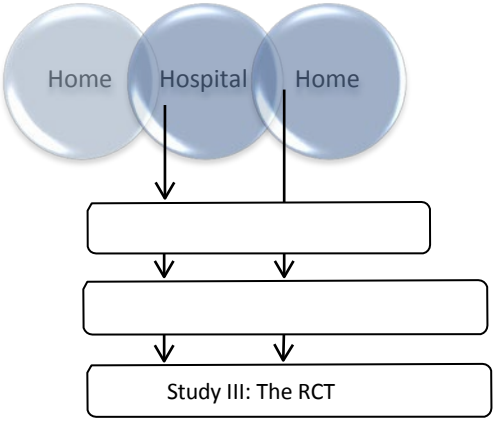
The validated 30s-CST ≤ 8 cut-off point has demonstrated the ability to identify community-dwelling older adults at risk of loss of functional mobility (114,116). A prediction model identifying older

adults at risk of loss of functional mobility (30s-CST ≤ 8) by using physical performance measures and self-reported information is expected to benefit patient management and trajectory.
A systematic functional assessment of medical patients with reduced physical performance is expected to identify those with a loss of functional mobility, or at risk thereof, and furthermore, to provide information on physical and functional issues, and form the basis of recommendations on mobilization and assessments of the need for post-discharge rehabilitation. Immediate post-discharge rehabilitation will support the older adults in being physically active.
Systematic functional assessment and immediate rehabilitation are expected to contribute to maintained physical performance. Furthermore, the combined effect of functional assessment and immediate rehabilitation is expected to affect older adults' physical performance more than either would on their own.

For these reasons this project aimed to identify older adults with persistent reduced physical performance after an acute admission, and to examine the effects of a systematic functional assessment on physical performance, when combined with immediate rehabilitation.

1.9. Aims and objectives

An overview of the aims and objectives of this thesis is provided below.



Based on two different designs, three studies were developed, all targeting older adults with reduced physical performance at admission.

<u>The prospective cohort study (Papers I and II)</u>

Study I: The 30s-CST

Aim: To examine the validity and responsiveness to change of the 30s-CST used to assess physical performance in older adults acutely admitted to a short-stay unit in the ED.

Objectives: To examine the instrument with regard to its:

1) construct validity when using 8 as a cut-off point for dependency in activities of daily living,

2) concurrent validity when compared to DEMMI,

3) responsiveness to change when compared to DEMMI.

Study II: The prediction model

Aim: To identify predictors for persisting, reduced physical performance in older adults following acute hospitalization.

Objectives:

1) to describe changes in physical performance in older adults from admission until a minimum of 14 days after admission

2) to identify potential predictors at admission for those older adults who have persistent reduced physical performance following hospitalization

3) to develop a simple prediction model that will enable clinicians to identify at the time of admission those older adults who will continue to have reduced physical performance following acute hospitalization.

A two-way factorial randomized clinical trial (Papers III and IV)

Study III: RCT

Objectives: To examine the effect on physical performance of a systematic functional assessment in the short-stay unit of older adults with reduced physical performance when combined with immediate rehabilitation.

Hypothesis: A systematic functional assessment in the ED or immediate rehabilitation will result in sustained or improved physical performance in comparison to a regimen in which neither of these interventions is offered.

2. Methods

2.1. Design

Two designs were applied in this project. A prospective cohort study was designed to follow a group of older adults with reduced physical performance at admission. The effect of the two interventions was assessed in a two-way factorial randomized clinical trial. Table 1 provides an overview of Studies I–III.

Table 1. Overview of Studies I–III

Study	Study design	Patients included	Patients in analysis	Outcome measures
Study I	Prospective cohort study. Patients were assessed within first 48 hours and 34 days after admission	207	Construct validity n = 207 Concurrent validity n = 156 Responsiveness to change n = 117	The 30s-CST, DEMMI, Self-reported information on activities of daily living
Study II		156	117	The 30s-CST Potential predictors
Study III	A two-way factorial randomized clinical trial. Patients were assessed within first 48 hours and 23 days after admission	336	272	Primary outcome: The 30s-CST Secondary outcomes: Barthel, EQ-5D-3L; Length of stay

2.2. Study population

All three studies recruited and included patients referred to the short-stay unit in an emergency department at Lillebaelt Hospital. The hospital catchment area has a mixed urban and rural population. All patients were recruited from three municipalities in the catchment area.

The prospective cohort study enrolled patients from December 2014 to May 2015. The RCT enrolled patients from April 2015 to August 2016, with follow-up data collected until October 2016.
In both the prospective cohort study and the RCT study, we enrolled patients admitted from Sunday till Friday at midday consecutively, until the calculated sample size was obtained.
An overview of the inclusion and exclusion criteria is provided in Table 2.

All included patients were 65 years of age or older and admitted for a medical reason (as distinct from surgical and psychiatric reason). A study population of older adults > 65 years of age are in accordance to other studies focusing on medical patients with functional problems (24,45,67). Since the diagnosis, in our study, is of less importance, neither diagnosis, nor severity or triage was considered during inclusion. We focus exclusively on physical performance and to prevent the enrolment of older adults too ill for mobilization, we include those who were able to sit independently on an ordinary chair within the first 48 hours of hospitalization.
The study population of interest (Study II and III) was older adults with a loss of functional mobility, or at risk thereof, and for this reason we only included patients performing ≤ 8 in 30s-CST. We assumed that patients performing above this threshold were without risk of losing functional mobility since hospitalized older adults at hospital admission have a lower physical performance compared to their habitual physical performance (59,102).

Table 2. Overview of inclusion and exclusion criteria for Studies I–III

Inclusion criteria	Exclusion criteria
Studies I–III	Studies I–III
Inclusion criteria	Exclusion criteria
- Able to sit independently on an ordinary chair within 48 hours - Oriented to time and place - Able to speak and understand Danish	- No habitual ability to walk
Specific inclusion criteria	**Specific exclusion criteria**
Studies II and III	Study III
Inclusion criteria	Exclusion criteria
- Performing ≤ 8 repetitions in 30s-CST	- Terminal illness - Not allowed to be physically active for medical reasons at time of inclusion

2.3. Outcome measures

Table 3 gives an overview of outcome measures used in Studies I–III.

Table 3. Overview of outcome measures collected in Studies I–III

Study	Outcome measure	Procedure	Data reduction
I &III	30s-CST	Standard chair Test trial followed by trial for number of repetitions performed in 30 seconds	Number of repetitions If unable to rise with hands crossed against the chest: score 0 If able to complete practical trial only: score 1
I &II	30s-CST ≤ 8	Standard chair Test trial followed by trial for number of repetitions performed in 30 seconds	Patients were classified as having low / reduced physical performance (30s-CST≤8) or high / non-reduced physical performance (30s-CST> 8)
I & II	De Morton Mobility Index (DEMMI)	Observational (DEMMI item 6, sit to stand no arms test not performed)	Score 0–100
II	DEMMI walking & DEMMI dynamic balance	Observational	Based on the hierarchical structure, no score higher than 53 can be achieved without the ability to perform for Item 6.
I	Activities of daily living	Self-reported information	Three response options: Without help; With help, or Cannot at all. The latter two were collapsed
III	Barthel	Questionnaire	Score 0–20
III	EuroQol	Questionnaire	Coding of perceived problems and conversion to EQ-index
III	Length of stay	Hospital's patient administration system	

The 30s-CST, the primary outcome measurement of Study III, has demonstrated good inter-rater reliability in acutely admitted older adults (157). The 30s-CST additionally measures lower body strength, which is associated with ADL (109,115). (Further descriptions in Section 1.4.3. and Paper III)
The 30s-CST ≤ 8 is a cut-off point validated in community-dwelling older adults by comparing with self-reported information on BADL and IADL (114,116). (Further description in Section 1.4.3.)
DEMMI is a reliable and valid physical performance measurement for acute, subacute, and community-dwelling older adults (22,117,118,158). (Further descriptions in Section 1.4.2 and Paper I & II.)

Activities of daily living: Information on ADL were collected through self-report by asking: "Can you bathe [dress, etc.] without help, with help, or not at all?" (Further information in Paper I).
The Barthel provides a valid and reliable measurement of geriatric patients' activities of daily living (159). Activities related to feeding, bathing, grooming, dressing, bowels, bladder, toilet use, transfers, mobility and stairs are assessed.
EuroQol (EQ-5D-3L) is a widely used, standardized non-disease-specific instrument for the measurement of health-related quality of life. The descriptive system consists of five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (160).
Length of stay (LOS)*:* Data were obtained from the hospital's patient administration system.

2.4. Data collection

A project physiotherapist assessed all patients for eligibility; if the patient was included, all baseline data for Studies I–III were collected within the first 48 hours of admission.
For Studies I–II baseline data were collected at admission by one project physiotherapist. To ensure that the follow-up data were unaffected by previous measurements, they were collected by another project physiotherapist.
All baseline data for Study III were collected before randomization by one of the abovementioned physiotherapists, the follow-up data by a group of assistants (nursing assistant, physiotherapist, and occupational therapist).
All follow-up data for Studies I–III were collected at a follow-up visit carried out at the patients' home. If patients were lost to follow-up the reason was registered by one of the following: Deceased, Not interested in a visit, Too ill for a visit, No contact.

To ensure a uniform interpretation of the self-reported information, the two project physiotherapists were in continuous communication. Furthermore, to ensure reliable data on 30s-CST and DEMMI, the inter-rater reliability was tested on 21 randomly selected patients admitted to the short-stay unit. The result was acceptable, showing an intra-class correlation ($ICC_{2.1}$) in the 30s-CST of 0.98 (95% CI: 0.96; 0.99) and in DEMMI of 0.87 (95% CI: 0.69; 0.95)(161).

Consistency in data collection (Study III) was achieved by the project physiotherapist instructing all assistants; furthermore, to align data collection procedures, all staff met for discussion twice during the period of data collection. Regarding Barthel and EQ-5D-3L, both project physiotherapists were present at meetings with the project assistants, and thus contributed to the group's interpretation of Barthel and EQ-5D-3L.

All data were collected in a questionnaire built in SurveyXact® for the purpose. A questionnaire was constructed for each data set: baseline data, follow-up data, medical records, etc. (Appendix B). To minimize data loss, the questionnaires were constructed in a way that made it impossible to proceed to the next question without answering the previous one.

2.4.1. Studies I and II: The 30s-CST and the prediction model

For Studies I–II, patients were assessed by the 30s-CST and their data concerning living arrangement, education, the Orientation-Memory-Concentration Test (OMC), and potential predictors were elicited.

All potential predictors were identified from the literature: ability to climb stairs and walk 400 meters (162), use of a gait aid before admission(163), falls, habitual physical activity, self-rated health (164), and difficulties in ADL two weeks before admission (165). After collection of data, the older adults with a 30s-CST ≤ 8 were tested by DEMMI.

The test protocols for the 30s-CST and DEMMI were followed, except for rising with hands crossed against chest, which was tested only in the former.

Information on discharge and transfer, presenting complaints, number of prescribed medications, and home help was extracted from the medical records.

The follow-up assessments were planned to be carried out in the patient's home 14 days after hospital admission. If the patient was unable to participate at the originally scheduled, a later visit was scheduled soon thereafter. The period of 14 days was chosen as the focus in study II was on older adults with reduced physical performance at admission, rather than a reduction due to inactivity after hospitalization.

2.4.2. Study III: The RCT

Randomization

After enrolment and baseline assessment, a secretary who was not in contact with the patients performed the randomization by opening opaque, sequentially numbered envelopes. To ensure smooth flow, block randomization stratified for each of the municipalities was used, and for concealment, a balanced internet-based randomization on 4, 8, and 12 blocks was used (166). The project physiotherapist informed the physiotherapist on duty of patients randomized to a functional assessment. Information on patients randomized to immediate rehabilitation was sent to the primary sector.

Follow-up data

The follow-up assessments were planned to be carried out in the patient's home three weeks after hospital admission. If the older adults were readmitted at time of follow-up, the data were collected during hospitalization or a later visit was scheduled. To allow all referrals on post-discharge rehabilitation to have started, the municipalities requested the follow-up data to be collected three weeks after the time of admission.

Blinding

It was not possible to blind neither the physiotherapist performing the systematic functional assessment nor the patients. We asked the primary sector staff receiving the information on

randomization to immediate rehabilitation to conceal it. To ensure that the follow-up data were unaffected by previous measurements, the assistants responsible for collecting follow-up data were not granted access to patient information collected at baseline and they were asked not to elicit information from the participants. When data was analysed, the randomized groups were concealed until intention-to-treat and per-protocol analyses were completed.

For adherence to the protocol

Adherence to the protocol for systematic functional assessment was tested using the DEMMI score. This was possible since the DEMMI is not used routinely in the short-stay unit. Regarding immediate rehabilitation, municipal records were consulted for obtaining the number of days between receipt of the referral and rehabilitation start.

2.5. Study III: The RCT - intervention

The patients were randomized to one of four groups: 1) Usual assessment and usual rehabilitation (*group I);* 2) usual assessment and immediate rehabilitation (*group II*); 3) systematic functional assessment and usual rehabilitation *(group III*); and 4) systematic functional assessment and immediate rehabilitation *(group* IV) (Figure 3).

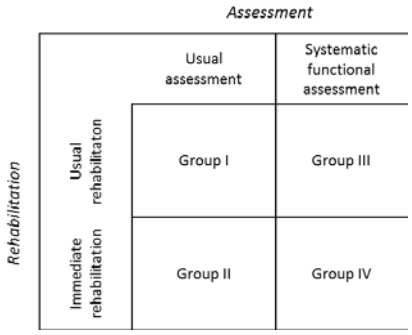


Figure 3. The four groups to which the patients were randomized

(Paper III. The effect of systematic functional assessment and immediate rehabilitation on physical performance in acutely admitted older adults with reduced functional performance : A randomized clinical trial)

Usual assessment (Groups I and II) (description of interventions are similar to the descriptions in Paper III): The usual assessments were performed by nurses and physicians, according to their preferences and skills. The assessments were usually based on self-reported information on the need for help with ADL (74). The rehabilitation need was typically determined by the diagnosis or need for help with ADL and identified by the physicians or the nurses in the short-stay unit. Activities aiming at maintaining physical performance seemed to have less focus (72).

Usual rehabilitation (Groups I and III): The usual procedure was followed on receipt of the referral; this involved assessing the patient's rehabilitation needs. The assignment was then passed on to a different physiotherapist or occupational therapist, who was also responsible for drawing up an individual rehabilitation plan taking into account the older adult's preferences, and other contextual

factors, such as other rehabilitation services being offered. Post-discharge rehabilitation must be initiated within 14 days of the primary sector staff's receipt of the referral.
In 2015, the three municipalities initiated rehabilitation within 21–52 days; for 2016 within 17–29 days (156).

Systematic functional assessment (Groups III and IV) was performed within 48 hours of admission. If needed, a referral on post-discharge rehabilitation was send to the primary sector. Afterwards, usual procedure regarding treatment, communication, etc., was followed.
The systematic functional assessment was designed in collaboration between the first author and experienced physiotherapists from the short stay unit and the geriatric unit. Recent research literature on older adults' and knowledge obtained in our study of the short stay unit were likewise integrated in the work (80). The theoretical concept underlying the development process was the International Classification of Functioning, Disability, and Health (ICF) (142), a bio-psycho-social framework focusing on the impact of the patient's health condition in which disability is consistently seen as a result of interaction between functioning and contextual factors (144). In the systematic functional assessment, we focused on body functions and activities, thus giving priority to aging, inactivity, and rehabilitation needs. In the planning of discharge and post-discharge rehabilitation, it is vital that all ICF components are included in the assessment. The systematic functional assessment was performed by one of the nine project physiotherapists, all of whom were familiar with the ICF framework. Both sexes were represented in the group; three of the physiotherapists had more than 10 years of experience, two had between five and 10 years, while five had qualified less than five years before. A checklist was developed to ensure consistence in assessment throughout the study period (Appendix C). The systematic functional assessment was based on information obtained from medical records and self-reports of mobility and ADL. Combining with De Morton Mobility Index (DEMMI) scores obtained at admission, we were able to base the assessment on information on morbidity, comorbidity, number of admissions within the last six months, falls, balance-walking problems, use of walking aid, habitual mobility, and need for ADL help; moreover, changes in mobility and ADL capability within the last six months, participation in and motivation for training. If needed, gait aids were provided for early mobilization, since the DEMMI includes items on getting out of bed, moving from sitting to standing position, and walking a distance of 50 meters. The information on mobility and balance provided a secure basis for the mobility training during hospitalization. Compared to physical exercises, a less strenuous mobilization appears to be more relevant in a short stay unit as patients are often tired and unavailable due to medical examinations (131).

Immediate rehabilitation (Groups II and IV): The local authorities' ordinary procedures were followed in this study, except for an agreement that immediate rehabilitation was initiated as soon as possible, preferably within 5 days.

The intervention was developed in cooperation with municipal rehabilitation centers, represented by the heads of the department and the therapists involved in post-discharge rehabilitation. A steering group with representation from all parties was appointed to monitor the conduct of the study.

The physiotherapist or occupational therapist in charge of rehabilitation was tasked with drawing up individual rehabilitation plans that took the older adult's preferences and contextual factors into account. They moreover coordinated with other rehabilitation services being offered.

2.6. The RCT study protocol

Before initiating the clinical trial, a study protocol was prepared and published (Paper IV). The following changes were made after its release:

Before initiating recruitment the sample size was adjusted in accordance with our experience from the first 78 patients in the prospective cohort study. For ethical reasons, we excluded patients who were terminally ill or proscribed from physical activity for medical reasons at time of inclusion. To assess self-efficacy, we had planned to use the Functional Activities Scale; however, personal communication with the author of the single article identified (Reliability and validity testing of self-efficacy for Functional Activities Scale; (167) convinced us of the futility of measuring self-efficacy, as older adults cannot reliably assess this. Instead, the EQ-5D-3L was included, to enable a later economic assessment.

Finally, due to adjustments of the hospital catchment area, patients were recruited from three rather than the planned two municipalities. The protocol data on patient satisfaction will be analysed elsewhere.

2.7. Statistical methodology

Sample size

The sample size used in the cohort study (Papers I and II) was calculated before recruitment. The sample size was designed with a view to the multivariate analysis in the prediction study (Paper II). The sample size was n = 50 + 8x, where x is the number of independent variables. For the prediction study, 10 independent variables and a 20% dropout was expected, and for this reason 156 patients were needed (168).

For the examination of construct validity in the 30s-CST study (Paper I) all patients regardless of the 30s-CST score were included. We assumed that 40% of the recruited patients would perform above eight, thus a sample size of 260 was scheduled for the study.

The sample size for the RCT study (Paper III) was changed before initiating the recruitment of patients. The changes were based on a pilot study that demonstrated a 30s-CST mean change of 3.9

repetitions and a standard deviation (SD) of 4 between admission and four weeks later. As the change needed to be clinically important, we aimed at a change higher than the Minimal Detectable Change (MDC_{90}), which is two sit to stands in the 30s-CST (169). The power calculation showed that 64 patients were required in each of the four groups to achieve β and **α** significance levels of 0.8 and 0.05, respectively. Because of the vulnerability of this group, a 30% drop-out rate was expected, thus requiring a total of 336 patients with 84 patients in each group.

Descriptive data

In Studies I–III, for the descriptive part, continuous data were reported as medians and interquartile ranges (IQR), categorical data in absolute numbers and percentages of occurrences.

2.7.1. Study I: The 30s-CST

For construct validity the following two a priori hypotheses were tested (170).

1. Comparing patients with low physical performance (defined as 30s-CST ≤ 8) with patients with high physical performance (defined as 30s-CST > 8), we expect a significant difference in need of help with ADL as measured by self-reported information.
2. With decreasing 30s-CST score, the relative number of patients in need of help with BADL will increase.

Fisher's exact test was used for testing the hypothesis regarding construct validity.

For concurrent validity the following two a priori hypotheses were tested (170)

1. Test results from the 30s-CST and DEMMI will show significant correlation.
2. The 30s-CST and the two DEMMI subsets Walking and Dynamic balance will be significantly correlated.

The correlation between the 30s-CST and DEMMI was examined using Spearman's rho, and a scatter plot was prepared for visual interpretation. A linear regression model was used to assess the relationship between 30s-CST scores and DEMMI scores and prediction intervals (PI) were calculated.

For responsiveness to change, the following three a priori hypotheses were tested (170)

1. In more than 75% of the patients, changes in DEMMI scores between the time of admission and follow-up will be greater than the MDC.
2. In less than 50% of the patients, changes in 30s-CST scores between the time of admission and follow-up will be greater than the MDC.
3. In less than 50% of the patients with 30s-CST scores > 5 at admission, the changes in the 30s-CST score between time of admission and follow-up will be greater than the MDC.

Percentages were calculated for the examination of the a priori hypotheses regarding responsiveness. This was supplemented by a scatter plot and the correlation on changes in 30s-CST score and The DEMMI score from time of admission to follow-up. (Further information in Paper I)

2.7.2. Study II: The prediction model

The prediction model was based on relatively a small sample, requiring consideration of model uncertainty. Overfitting—that is, where the model fits the data under study but is not valid in another dataset—is a another concern with small data sets (171). To meet the challenges regarding uncertainty and overfitting, decisions regarding cut-off points were based on the literature, as well as on Receiver Operation Characteristics (ROC).

For the univariate logistic regression analysis, all continuous variables were dichotomized, except that age was classified into five levels. For the multivariate analysis, age and gender were preselected. The smallest number of events decided the allowed number of additional predictors in the multivariate analysis (172). Potential predictors were included in the multivariate analysis, using the following data reduction: 1) potential predictors with a *p* value ≤ 0.20 in the univariate analysis were considered (173); 2) all potential predictors were classified into five different domains; if the domain predictors had a moderate (> 0.50) correlation, the potential predictor with the highest odds ratio was selected; 3) the final selection of predictors was based on the odds ratios and ease-of-handling in an ED.

A cut-off point at p ≤ 0.20 was chosen to minimize the risk of overfitting; a lower cut-off point would have risked ignoring important potential predictors. Regarding model uncertainty and risk of overfitting, both age and gender were included, since they are well-known factors related to physical performance.

The internal validity was evaluated by the bootstrapping method to check for model uncertainty (171). The prediction model's performance was assessed by calculating the sensitivity/specificity and predictive values. For the clinical perspective, the number needed to treat/test (NNT) was calculated using 1/absolute risk of reduction. The latter is defined as the number of patients that would need to be treated to prevent one adverse outcome within a given period, which was the study's follow-up time (174). (Further information in Paper II)

2.7.3. Study III: The RCT

The intervention group and the control group were compared in order to assess homogeneity within the randomized groups. Fisher's exact test was used for categorical variables. The Kruskal–Wallis test for continuous variable non-normally distributed data.

Analyses of primary and secondary outcomes were conducted according to the intention-to-treat principle.

The 30s-CST and LOS were analysed using a negative binominal regression model. The Barthel and EQ-5D-5L were analysed using linear regression. The baseline measurement was used as a covariate in the analyses. A test for interaction was performed; since no significant interactions were found, the data were collapsed and tested for a main effect. Based on the lack of adherence to the protocol

for immediate rehabilitation, a per-protocol was performed. This was followed by ancillary analyses. (Further information in Paper III).

2.8. Ethical issues

The Regional Scientific Ethical Committees of Southern Denmark approved the prospective cohort study with a waiver (20.08.2014). As required by Danish legislation (Appendix D), written informed consent to collect information from medical records was obtained from all participants. The prospective cohort study was registered with the Danish Data Protection Agency (2008-58-0035) and on ClinicalTrials.gov Identifier: NCT02474277 (12/10/2014).

The Regional Scientific Ethical Committees of Southern Denmark approved the two-way factorial randomized clinical trial; Project ID: S-20130168. Written informed consent was obtained from all participants (Appendixes E and F). The clinical trial was registered with the Danish Data Protection Agency (2008-58-0035) and on ClinicalTrials.gov. Identifier: NCT02062541. (02/12/2014)

3. Results

3.1. Studies I and II: The 30s-CST and the prediction model

A summary of the results of Studies I and II is provided here further details in Papers I and II.

Description of the patients included in the cohort study (Paper I and II)

Overall, 820 patients were admitted to the ED during the recruitment period. We screened 463 patients for eligibility.

Ninety-three (38%) patients were not oriented in time and place; 49 patients (20%) were unable to sit on a chair; 25 (10%) had no walking ability, and 13 (5%) were unable to speak or understand Danish. Although they were ineligible for the prediction model (Paper II), concurrent validity and responsiveness to change (Paper I), an additional 51 (21%) older adults with a 30s-CST score > 8 were enrolled for the assessment of construct validity (Paper I).

The sample used for the examination of responsiveness to change was also used for the prediction model (Paper II).

The follow-up visit to the patient's home occurred a median of 34 days (IQR 27–40 days) after hospital admission. Of the patients lost to follow-up, 25 (64%) said they were not interested in a visit or no contact was established, five (13%) had died, while nine (23%) were either readmitted or too ill for a visit.

An analysis of completers compared to non-completers (n = 39) revealed no significant differences regarding the variables assessed at time of hospital admission, except for the fact that 64% non-completers had no independent walking ability, while 43% of completers did (p= 0.02).

Physical performance changes from hospital admission to follow-up

Overall, 78 (67%) of the patients improved their 30s-CST score; 35 (30%) showed no change, while four (3%) scored lower. In DEMMI, 88 (75%) showed improvement, 13 (11%) saw no change, and 16 (14%) had lower scores. Sixty-nine of the 117 (59%) patients were unable to perform a 30s-CST at admission; at follow-up, 34 of 117 (32%) patients were unable to rise. More than half of the patients experienced a 30s-CST improvement of 5 (IQR 3–7); 19% had improved substantially, since their 30s-CST score was 0 at admission and 11 at follow-up (IQR 10–12).

3.2. Study I: The 30s-CST

Construct validity

The examination of construct validity was based on 207 patients (median age 76 years (IQR 71–84); 57% female). The 207 patients scored between 0–14 in the 30s-CST, with a median of 2 (IQR 0–8). The examination of construct validity demonstrated a significant difference concerning the need for help with ADL at time of admission between patients with low performance (30s-CST ≤ 8) and high performance (30s-CST > 8) (Figure 4). Moreover, the proportion of patients in need of help with ADL decreased with increasing physical performance.

Table 4. Construct validity of the 30s-CST≤8 and risk of functional mobility loss

Activities of daily living	30s-CST[1]≤8 (n = 156)		30s-CST>8 (n = 51)		
	n	%	n	%	*p*-value
Need help with dressing	17	11	0	0	0.01
Need help with bathing	31	20	0	0	<0.001
Need help with cooking	47	30	1	2	<0.001
Need help with cleaning	98	63	5	10	<0.001
Need help with shopping	76	49	4	8	<0.001
Need help with at least one BADL[2]	34	16	0	100	<0.001
Need help with at least one IADL[3]	110	71	7	14	<0.001
Need help with at least one activity	112	72	7	14	<0.001

[1]30-second Chair -Stand test (30s-CST) [2]Basic activities of Daily Living (BADL) [3]Instrumental activities of Daily Living (IADL)

(Paper I. Validity and responsiveness to change of the 30-second Chair-Stand test in Older Adults admitted to an Emergency Department)

Concurrent validity

The examination of concurrent validity was based on 156 patients (median age 78 years (IQR 71–85); 88% female). At the time of admission, their median 30s-CST score was 0 (IQR 0–5); for DEMMI the median was 44 (IQR 30–61).

The examination of concurrent validity demonstrated significant correlation between 30s-CST and DEMMI (r = 0.72) ($p < 0.001$); the 30s-CST is therefore acceptable as a physical performance test at the time of admission. Figure 4 illustrates a floor effect, as well as a wide range of changes in DEMMI, for every 30s-CST-score. The result shows that, compared to 30s-CST, DEMMI has better responsiveness to change, especially for patients with low physical performance.

For the DEMMI subsets Walking and Dynamic balance, the correlation with the 30s-CST was r = 0.55 (p< 0.001) and r = 0.69 (p< 0.001), respectively. The found correlation was lower than the acceptable level of 0.70 (161). The DEMMI subsets also demonstrated a floor effect.

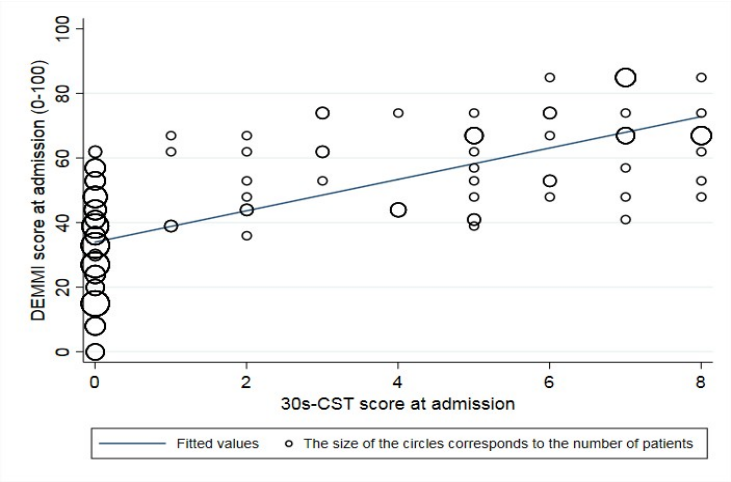


Figure 4. DEMMI and 30s-CST scatter plots

(Paper I. Validity and responsiveness to cchange of the 30-second Chair-Stand test in Older Adults admitted to an Emergency Department)

Responsiveness to change

The examination of responsiveness to change was based on 117 patients (median age 77 years (IQR 71–85); 58% female). The follow-up 30s-CST median was 6 (IQR 0–10); DEMMI had a median score of 62 (IQR 44–67).

Responsiveness was tested by three hypotheses. Moreover as shown in Table 5, neither of the first two hypotheses was corroborated by the results, whereas the results confirmed the third hypothesis.

Table 5. Responsiveness to change

Hypotheses	At admission Mean (SD[4])	At follow-up Mean (SD)	n	%
1. Changes in DEMMI[1] scores between time of admission and follow-up were higher than MDC[2] in more than 75% of the patients.	45.6 (18)	61.2 (16)	72	62
2. Changes in 30s-CST[3] scores between time of admission and follow-up were higher than MDC[2] in less than 50% of the patients.	2.2 (3)	5.9 (5)	71	61
3. In less than 50% of the patients with a 30s-CST>5 at admission, the changes in 30s-CST scores between time of admission and follow-up were higher than MDC[2].	7 (1)	10 (3)	19	16

[1] De Morton Mobility Index (0-100) [2]MDC for DEMMI: 9. MDC for 30s-CST: 2 [3]30-second Chair Stand test
[4] Standard Deviation

(Paper I. Validity and responsiveness to change of the 30-second Chair-Stand test in Older Adults admitted to an Emergency Department)

Figure 4 illustrates a wide range of changes in the DEMMI, for each 30s-CST score and this illustrated a better responsiveness to change in DEMMI. The correlation between changes in DEMMI and the 30s-CST was low (r= 0.43) (p< 0.001).

3.3. Study II: The prediction model

The patients' median age was 77 years (IQR 71-85 years). At time of admission, patients with reduced physical performance (30s-CST ≤ 8) at follow-up were older (78 years; IQR 72-86) than patients with non-reduced physical performance (30s-CST > 8) at follow-up (75 years; IQR 70-80).

The univariate analysis revealed ten potential predictors with p-values ≤ 0.20 for the multivariate analysis; since the smallest event group contained only 41 events and each predictor intended in the multivariate analysis requires ten events, the number of potential predictors had to be narrowed down to four (172). Age and gender were preselected and the remaining two predictors were selected using the aforementioned data reduction.

The final predictors were age, gender, walking aid use before hospitalization, and a 30s-CST score ≤ 5 (Table 5). A score > 1.8 at admission identified 78% who continued to have reduced physical performance one month after acute hospitalization. Moreover, only three patients were needed to identify one patient with reduced physical performance a median of 34 days (IQR 27–40 days) after admission (NNT).

Table 6. Prediction model to identify patients with persistent reduced physical performance after hospitalization

Predictors	Beta coefficient
age > 85 years	0.1
female gender	0.6
Use of walking aid (in/outdoors)	1.5
30s-CST ≤ 5	1.8
	4.0

	Sensitivity (95% CI)	Specificity (95% CI)	Positive predictive value (95% CI)	Negative predictive value (95% CI)
Prediction model (cut-off >1.8)	82% (71–90)	59% (42–74)	78% (68–87)	63% (46–78)

(Paper II. A prediction model to identify hospitalised, older adults with reduced physical performance.)

3.4. Study III: The RCT

A summary of the results in Study III is provided here (Paper III gives further details).

A total of 1585 patients were assessed for eligibility; 1249 were found to be ineligible, 920 of whom failed to fulfil the inclusion criteria. The major reasons were a 30s-CST score > 8 (35%) and not oriented in time and place (30%) (Figure 5).

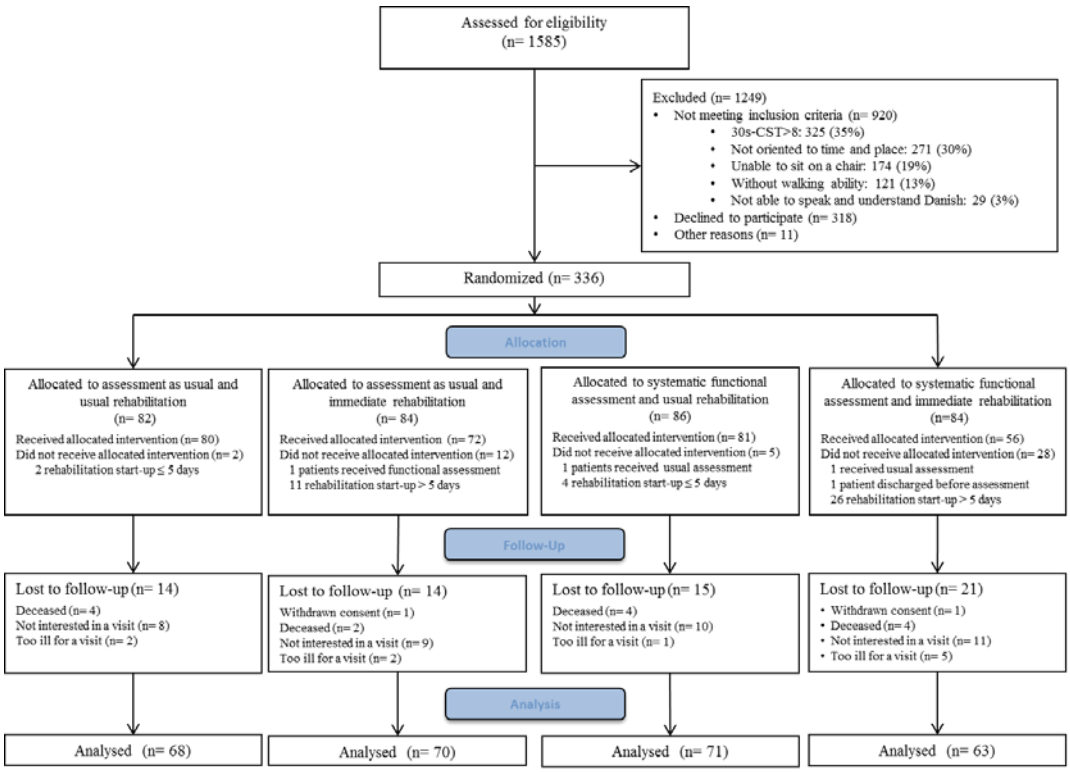


Figure 5. Flowchart

(Paper III. The effect of systematic functional assessment and immediate rehabilitation on physical performance in acutely admitted older adults with reduced functional performance: A randomized clinical trial)

The inclusion criteria were fulfilled by 336 patients. Two patients later withdrew their consent, leaving 334 patients for analysis.

A comparison of completers to non-completers (n = 62) showed no significant differences in baseline variables or from medical records (age, gender, living arrangement, use of waking aids, the OMC, etc.).

The follow-up visit occurred a median of 23 days (IQR 21–29) after admission, the majority were carried out in the patients' home.

Intention-to-treat analyses were performed on the primary outcome, the 30s-CST (Table 7), and on the secondary outcomes, Barthel, EQ-5D-3L, and LOS. No statistically significant differences between the intervention and control groups were found. As no statistically significant difference regarding interaction was found, data were collapsed into two groups for the examination of the difference between usual assessment and systematic functional assessment and the examination of the difference between usual and immediate rehabilitation. This revealed no significant differences.

Table 7. Primary outcome by group and primary outcome by intervention

30s-CST[1], by group					
At baseline mean (SD[2])	At follow-up mean (SD)	Intention to treat	IRR[3]	95% CI[4]	*p*-value
3.1 (3.2)	6.2 (4.9)	Assessment as usual and usual rehabilitation (group I) (n = 68)		Reference	
3.0 (3.0)	5.8 (4.2)	Assessment as usual and immediate rehabilitation (group II) (n = 70)	0.99	0.7;1.3	0.93
3.5 (3.4)	6.4 (4.9)	Systematic functional assessment and usual rehabilitation (group III) (n = 71)	1.0	0.8;1.3	0.99
3.2 (3.1)	6.1 (3.9)	Systematic functional assessment and immediate rehabilitation (group IV) (n = 63)	0.99	0.7;13	0.95
		Interaction assessment and rehabilitation			1.0
30s-CST, by intervention					
		Intention to treat			
3.0 (3.1)	6.0 (4.5)	Usual assessment (n = 138)		Reference	
3.3 (3.2)	6.3 (4.4)	Systematic functional assessment (n = 134)	1.0	0.8;1.2	0.98
3.3 (3.3)	6.3 (4.9)	Usual rehabilitation (n = 139)		Reference	
3.1 (3.0)	5.9 (4.0)	Immediate rehabilitation (n = 133)	1.0	0.8;1.2	0.91

[1] 30-second Chair- Stand Test (30s-CST) [2] Standard deviation (SD) [3]Incidence rate ratio (IRR) [4]Confidence interval(CI)

(Paper III. The effect of systematic functional assessment and immediate rehabilitation on physical performance in acutely admitted older adults with reduced functional performance: A randomized clinical trial)

Scrutiny of the implementation of the systematic functional assessment in the short-stay unit showed adherence to protocol, given that 269 (99%) of the older adults received it in accordance with their assigned group.

We did not collect data on the degree of mobilization in the short-stay unit or any subsequent department.

A total of 82 referrals were sent from the hospital to the municipalities. Scrutiny of the municipal response to patients allocated to immediate rehabilitation demonstrated that only 39 (48%) of the patients received it in accordance with their assigned group (immediate was defined as initiation within five days of referral).

A per-protocol analysis demonstrated no significant difference for either rehabilitation or assessment between the groups. Analysis of the secondary outcomes (Barthel and EQ-5D-3L) demonstrated no significant differences.

Ancillary analyses

When usual assessment was compared to systematic functional assessment, no significant difference was found in the baseline data, except that the systematic functional assessment resulted in a higher number of referrals to post-discharge rehabilitation.

An examination of the patients who received a referral showed that 31 (38%) had had no contact to the primary sector within the six months prior to admission; of these, 15(48%) were discharged from the short-stay unit.

The 30s-CST score at time of admission was shown to be significantly associated with LOS; the percentage change in the incident rate was approximately 1% decrease in LOS for every extra sit-to-stand repetition.

Regarding patients discharged from the short-stay unit and patients transferred to another department, a significant difference was found in the 30s-CST, the Barthel, the EQ-5D-3L and the OMC.

4. Discussion

This section first presents the key findings, which are followed by a discussion of selected results. The strength and limitations of this project are then discussed.

4.1. Key findings

The key findings of this thesis are:

- Study I: This study demonstrated that the 30s-CST is a valid measurement tool for acutely admitted older adults; the validation has thus provided a physical performance measurement tool suitable for assessing the high number of geriatric patients admitted to short-stay units. In addition, by using a score of eight as cut-off point in the 30s-CST, we have enabled the identification of older adults who may need help with activities of daily living and who require further functional assessment.
- Study II: This study has shown that, at admission, an assessment using the 30s-CST and a cut-off point at five combined with information on age, gender, and use of gait aid enables the identification of the majority of older adults with persistent reduced physical performance one month after admission. Clinically, it identifies older adults who are prone to inactivity during and after the hospital stay, and for whom further functional assessment would be beneficial.
- Study III: In this study, a systematic functional assessment and immediate rehabilitation showed no significant difference on physical performance. The study is weakened by the incomplete disclosure of mobilization during the hospital stay and the low adherence to the rehabilitation protocol.

4.2. Physical performance improvement during the hospitalization

In all three Studies, the majority of acutely admitted older adults improved their physical performance from admission to follow-up. The improvements from admission to follow-up concur with findings in other studies (68,139-141). The three studies also demonstrate that, despite improvements, at least

50% of the older adults continued to have reduced physical performance at follow-up (30s-CST≤ 8). The latter fact supports the usefulness of measuring physical performance at admission for the identification of older adults with persistent reduced physical performance.

Studies I–II also demonstrate substantial performance improvement for some of the patients, indicating that the reduction in physical performance may have been temporary, something which is not revealed by the physical performance measure. The identification of older adults with continued low physical performance can thus be improved by supplementing self-reported information, as this will elucidate habitual physical performance.

Moreover, it is important to be aware that, despite improved physical performance during and immediately after hospitalization, a decline in physical performance may have occurred, compared to the situation prior to the presenting illness. It has been demonstrated that older adults have attenuated response and suppressed muscle function following immobilization or step reduction for two weeks (82,85,86). This is supported by a study of 15–20-minute sessions of mobility interventions of older adults admitted for medical treatment. A significant difference on follow-up mobility after one month was detected. However, this improvement was based on a decreased mobility level in the control group (175).

Clinically, it would be relevant to evaluate the older adults with reduced physical performance at home, as well as during hospitalization, using the 30s-CST. Ongoing monitoring would provide an opportunity to assess whether the previous level has been achieved after illness or hospitalization. Such measures would follow the recommendations for using the 30s-CST in community-dwelling older adults when they show signs of reduced physical performance (101).

In Study III, the self-reported information on ADL was assessed using the Barthel. The results showed little or no improvement from admission to follow-up. This is in contrast to other study results, according to which 30%–50% of older adults report a decline in their ADL after the hospital stays (19,56,57,60,61). However, the difference is due to the use of different baselines. Usually, in order to eliminate the possible effects of the illness that led to admission, a retrospective measure of the state two weeks prior to hospitalization is used as baseline for self-reported information on BADL and IADL. In Study III, we asked the participants to assess their current performance in the activities described in the Barthel. Our results are similar to those obtained in an observational study on medical patients whose baseline was the functional status just before admission (104). Although no significant changes in ADL were observed, an improvement in physical performance was demonstrated (104).

Older adults reporting functional decline after release from hospital underscores the importance of ongoing monitoring to determine whether the patients' previous level has been achieved post hospitalization. The more so as, their need for help with ADL appears to change frequently (38).

4.3. The 30-second Chair Stand Test

In Study I, the 30s-CST was compared to DEMMI in order to examine concurrent validity. DEMMI was chosen as it provides a valid and reliable measure of physical performance in hospitalized older adults and community-dwelling older adults, with no floor effect at admission (22,117,118,158,176). However, validation of an easy-to-use physical performance test was needed, as DEMMI is time-consuming and requires spacious rooms, and is thus difficult to implement in a short-stay unit, especially when quick screening is required.

In Study I, the examination of construct validity showed a significant difference in ADL in patients with low physical performance, when compared to patients with high physical performance ($p < 0.01$). Those with low physical performance thus needed more help with ADL than those with high physical performance. The proportion of patients in need of help with ADL also decreased with increasing physical performance, as measured by 30s-CST. These results support the well-established association between physical performance measures and self-reported information on ADL in community-dwelling older adults (108,109). In addition, older adults' deterioration is typically reflected in a loss of ability to perform IADL, followed by deterioration in BADL (28,162). This association is illustrated by Study I, in which 71% of the older adults with a 30s-CST ≤ 8 needed help with at least one of the following IADL activities: cooking, cleaning, or shopping, while only 16% needed help with bathing or dressing (i.e., BADL).

Implementing the 30s-CST in the short-stay unit would provide an opportunity to combine physical performance measures with self-reported information, for instance in cases where the self-reported information appears to be unrealistic, as is often the case with this group (90). The 30s-CST would moreover enable staff to identify older adults in need of further assessment of ADL.

The examination of concurrent validity revealed that the 30s-CST provides an acceptable assessment of physical performance in older adults at time of admission. The validation of the 30s-CST has provided a handy format for physical performance test suitable for acutely admitted older adults, thus enabling practical and early assessment of the large number of geriatric patients admitted to the short-stay unit. Moreover, the validation of the 30s-CST for this patient group has provided the opportunity for continuous evaluation of their physical performance across the health system.

The examination of concurrent validity demonstrated that 60% of the acutely admitted older adults in Studies I–II were unable to rise with hands crossed against the chest (30s-CST= 0) at admission. A floor effect of 60% presents a major challenge, which questions the applicability of the test. If the well-known test of sit-to-stand five times had been used, an even larger floor effect would have occurred, since the cohort study data show that 73% of the older adults were unable to complete five repetitions (177). A floor effect has also been demonstrated for gait speed. Between 35 and 54%

of the acutely admitted older adults were unable to perform the test at time of hospital admission (24,99). In contrast, while the DEMMI has no floor effect, it fails to include lower body strength and gait speed, which are indicators of the ageing process (the attenuation of muscle mass, fast fibres and motor units) (30-34) thus relating to ADL (109,110,112).

We did not find an acceptable association between the 30s-CST and the DEMMI subsets of Walking and Dynamic balance. However, the assessment showed that a great number of older adults with a 30s-CST = 0 also scored low on walking ability and dynamic balance. Although this information is important in order to avoid falls during hospitalization, it is not revealed in the DEMMI sum score (178). The floor effect found in the 30s-CST, gait speed and the mentioned DEMMI subsets demonstrate that a floor effect is common and inevitable in single-item tests of physical performance, since no easier tasks can be added. Moreover, a person's inability to complete a test discloses important clinical information; a 30s-CST score = 0 thus reveals a risk of loss of ability to perform BADL (121).

The examination of concurrent validity demonstrates that the single-item 30s-CST provides an acceptable assessment of older adults' physical performance at admission. Its ease of use favours the use of 30s-CST in short stay units.

The floor effect in the cohort study was similar to the 46%–66% shown in studies based on data collected in 2012 and 2013 (published in 2015 and 2016). They used the 30s-CST for acutely admitted older adults enrolled in a short-stay unit at a Danish ED (157,179). This is interesting, since it is similar to the baseline 30s-CST scores in Studies I-II (IQR 0-5), whereas the baseline score in Study III was 3 (IQR 0-6). In the cohort and the RCT sample, the following variables are similar: the number of patients with a 30s-CST score > 8; not oriented in time and place; terminally ill or unable to sit on a chair; without habitual walking, and not interested in a visit. The same applies for these factors: number of readmitted patients; too ill for a visit, and deceased. The only difference between other studies on acutely admitted medical patients and our RCT study appears to be the time of data collecting. This is noteworthy, as Acute Teams were implemented in the municipalities during the project recruitment period, which may have allowed a larger share of the physically weakest older adults to be taken care of in their homes.

Regarding responsiveness to change, the DEMMI performed better than the 30s-CST, especially in older adult with low physical performance. Responsiveness was tested by hypothesis and by correlation, the former to ascertain whether 30s-CST and DEMMI scores changed according to what could be expected based on the literature. As demonstrated in Study I, only hypothesis 3 was corroborated by the result. The result of hypothesis 1 and 2 can be explained by a study of geriatric inpatients (> 65 years), in this study the DEMMI changes gave a better reflection of low-performing patients, while high-performing patients were best reflected in the 30s-CST changes (180). In Study I,

50% of the included patients had a 30s-CST improvement of five; in addition, 19% of the patients were habitual high performers (a median follow-up 30s-CST = 11). The high number of patients showing improvement indicates that the low baseline score for the majority of older adults was temporary.

Compared to the DEMMI, the aforementioned improvement in 30s-CST scores favours the use of 30s-CST as outcome measurement. The advantages of the 30s-CST include its ability to serve as a proxy for the measurement of lower body strength, which reflects important aspects of the ageing process and is associated to ADL.

4.4. Identification of older adults in need of further functional assessment

In Study II, a prediction model of physical performance and self-reported information was developed. The model included data on 30s-CST ≤ 5, age, gender, and use of a walking aid. The cut-off point was > 1.8. The model identified 78% of the older adults with continued reduced physical performance (30s-CST ≤ 8) one month after admission.

The choice of a 30s-CST score ≤ 5 was based on ROC analysis and literature studies; it was, however, lower than the cut-off point for community-dwelling older adults (30s-CST ≤ 8). Selecting a lower cut-off point for the acutely admitted, rather than the community-dwelling older adults, is supported by a study comparing the Short Physical Performance Battery (SPPB) scores of the two groups. In that study, the hospitalized older adults also had a lower score compared to the SPPB scores of their community-dwelling peers (102).

The well-established relation between age, gender, and physical performance enabled the preselection of age and gender (114,162,180).

The use of gait aid as a predictor is also included in Hoogerduijn et al.'s model for assessing the risk of functional decline in acutely hospitalized older adults. Their model is based only on self-reported information and thus different from the prediction model developed in Study II. Hoogerduijn et al. included self-reported information on the preadmission need for assistance with IADL, need for assistance with travelling, and lack of education after age 14 (181). Whereas educational level is easily determined by asking the patient in the ED, reliable information on the need for assistance with travelling may be harder to obtain, as it less well defined and moreover depends on the situation. For instance, being married has shown an association with greater odds for using personal assistance (182). In contrast, in older adults there is an association between not being married, age, and the use of walking aids and low activity after discharge to the home (183). These examples illustrate that an assessment including all ICF components is necessary when planning discharge or post-discharge rehabilitation.

The use of gait aids is often a compensatory strategy to improve mobility and balance, thus indicating limited 'safe margins'. The relation between mobility and use of gait aids was demonstrated in a study of acutely admitted medical patients (179), which showed that inability to perform one rise in the CST at admission was associated with low mobility 30 days after discharge. Moreover, at time of admission, 80% of older adults with low mobility at follow-up used a gait aid at the time of admission, whereas 36% of older people with high mobility used a gait aid (< 0.0001) (179).
Even though the older adults use gait aids to improve mobility and balance, other factors, such as dizziness are also relevant (182,184), which demonstrates the need for further medical assessment following the identification of older adults with persistent reduced physical performance.

From a clinical perspective, the prediction model should not stand alone as its negative predictive value is only 63%, which implies that every third person with a negative test will still be at risk of reduced physical performance following acute hospitalization.

A new and larger study is needed for the verification of the prediction model. If further research supports the model, it should prove itself to be useful in acute settings where older adults with persistent reduced physical performance are identified, as their proneness to inactivity is a concern. The examination of the construct validity when using eight as cut-off point demonstrates a relation between performance and the need for help with ADL. In addition, the functional assessment performed as a part of the clinical trial has demonstrated the ability to identify those in need of post-discharge rehabilitation among older adults with reduced physical performance at admission.
To illustrate the several applications of the 30s-CST, Figure 6 shown a model for the implementation of an assessment of acutely admitted older adults in a short-stay unit, based on our own findings. Regarding construct validity (Paper I) (left-hand and middle vertical paths of figure), the focus was on differences in the need for help with ADL for older adults with low or high physical performance. Regarding the prediction model (Paper II) (right-hand vertical path), we focused on predicting persistent reduced physical performance. For the left- and right-hand vertical paths, further assessment is needed in order to include the additional components of the ICF model. Moreover, Figure 6 is based on older adults assessed at the time of admission, including two clusters: 1) older adults discharged from the short-stay unit who demonstrated a significantly higher level of physical performance (median 30s-CST = 5), compared to 2) older adults transferred to other departments (median 30s-CST = 0). This means, that the older adults discharged from the short-stay unit need further assessment, which include the additional components of the ICF model. Older adults who are transferred to other departments are in a state of frailty that demands a comprehensive geriatric assessment regarding their health condition. Moreover, when discharge and post-discharge rehabilitation is planned, the additional components of the ICF model also need to be considered.

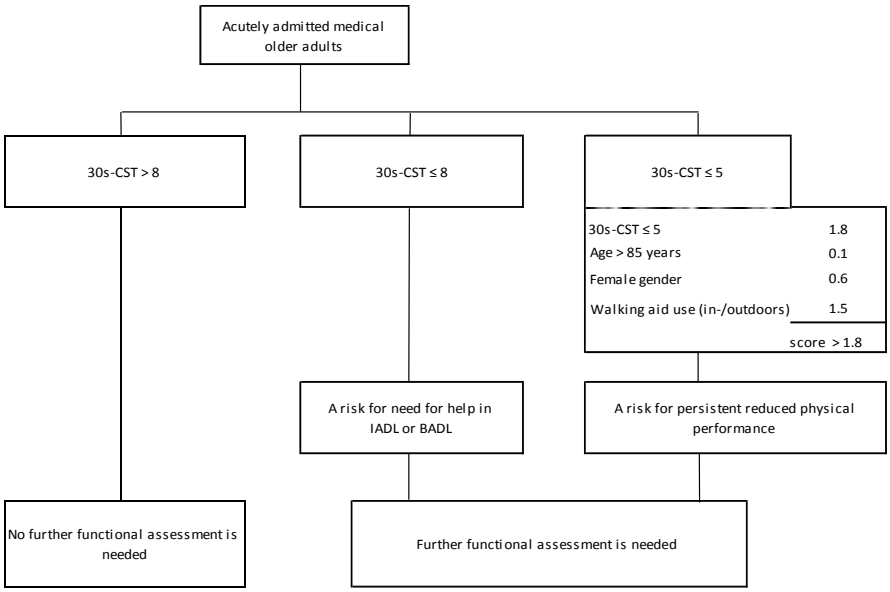
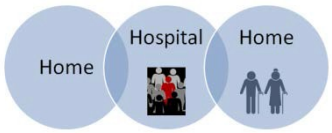


Figure 6. Model for identification of older adults in need of further functional assessment

4.5. Systematic functional assessment and immediate rehabilitation



Study III examined the combined effect of a systematic functional assessment and immediate rehabilitation when responsibility for post-discharge rehabilitation is passed on to the primary sector. We assumed that a systematic functional assessment would identify those with a loss of functional mobility, or at risk thereof, furthermore to provide information on physical and functional issues, and form the basis of recommendations on mobilization and assessments of the need for post-discharge rehabilitation. We also assumed that immediate rehabilitation would support older adults in being physically active. However, we found no significant difference in physical performance in either the intention-to-treat analysis or the per-protocol analysis.

A systematic functional assessment

An effectiveness study on 15–20-minute walking and mobility sessions twice a day with older adults admitted for medical treatment has demonstrated a significant effect on follow-up mobility after one month (175). Another study on supervised walking sessions for 20 minutes a day has demonstrated that more patients in the intervention group were discharged to their own home (123). The mobility studies mentioned above are different from our study in that one person was dedicated to perform the walking and mobility sessions.

The necessity of ensuring the clear delegation of responsibility for mobilization training of hospitalized patients is supported by a study on multidisciplinary collaboration. It demonstrates that when, e.g., physiotherapists recommended physical activity and delegated supervision to the nursing staff, the result was ill-defined ownership among multiple staff members (185). Furthermore, despite

appropriate and generally accepted recommendations, their value was weakened by heavy workloads and stress among staff (185).

The systematic functional assessment was easy to implement in the clinic, however responsibility for executing its recommendation of mobility training was delegated to the already busy nursing staff. No data on subsequent mobilization were collected, and poor implementation may have played a role in our lack of success with demonstrating an effect. Moreover, the studies on assisted walking and the consequences of vaguely defined responsibility (175,185) indicate that the nonsignificant difference found implies that the identification of older adults having a loss of functional mobility or at risk of this and passed-on recommendations are insufficient for maintaining the older adults' physical performance during hospitalization.

A total of 61% of the patients enrolled in Study III were transferred to another department. The health professionals in the receiving department welcomed the short-stay unit's systematic functional assessment, since it provided an opportunity for faster continuation of mobilization (80). In our case, where a high number of older adults were transferred to other department this may have weakened the effect of the systematic functional assessment. The health professionals in the receiving department had to be aware of the systematic functional assessment provided in the short-stay unit, moreover the responsibility for mobilization was delegated to an even higher number of health professionals. As no data on mobilization were collected, poor implementation may be a significant source of error.

Despite the non-significant result on older adults' physical performance, the ancillary analysis shows the relevance of systematic functional assessment. We documented that, in comparison to usual assessment, the systematic functional assessment was successful in identifying a significantly higher number of patients in need of a referral to post-discharge rehabilitation. The fact that a nonsignificant results was found for the additional baseline variables lead us to believe that the higher number was related to a need for post-discharge rehabilitation rather than the stronger attention.

The insignificant result and the lack of transparency in delegation of responsibility led to a questionable implementation of the mobilisation recommended in the systematic functional assessments. It is likewise open for discussion whether the systematic functional assessment, considered as an intervention, in fact led to an examination of organizational issues rather than a scrutiny of the effect on older adults' physical performance. We recommend that the impact of a systematic functional assessment is examined by focusing on the organizational impact rather than the 30s-CST. However, the 30s-CST is a relevant outcome measurement for the assessment of the effect of mobilization during and after hospitalization.

Immediate rehabilitation

We assumed that immediate rehabilitation would support older adults in being physically active. The number of referrals (n = 82) lowered the power and the chance of identifying a possible difference. Low adherence to the protocol for immediate rehabilitation lowered the power even further. Therefore, this study cannot provide any evidence on the effect of immediate post-discharge rehabilitation. In hindsight, it is clear that an interim analysis or procedural integrity check should have been performed.

A study has demonstrated improved functional ability and fewer emergency readmissions after an intervention involving initiation of an individualized exercise programme at the time of admission, facilitation during the hospitals stay, follow-up visit within 48 hours by the hospital nurse, and follow-up telephone calls (132,186). Based on this study, it appears that there is a need for a dedicated person employed by the hospital to take charge of post-discharge rehabilitation, at least until the primary sector is ready to take over.

However, the difficulties with adherence to the protocol for rehabilitation need to be explored, just as further research on different models for rehabilitation transitions is required. The low adherence to the protocol may be explained 1) by the older adults' frailty and lack of energy; 2) the force of habit – the organizational regulations prescribed that the post-discharge rehabilitation had to be initiated within 14 days; 3) heavy workloads and a lack of resources in the municipalities, and 4) the different perspectives of the secondary and primary sectors (21)– exemplified by hospital nurses whose first priority was to convey information on ADL, nurses in home healthcare while the first priorities for are to receive information on medical problem/diagnoses (149).

Efficient transition procedures depend on shared involvement and coordinated follow-up (148,151,152), although they may be challenged different organizational aims (21,146,147,149).

In a national perspective, 13 % of the Danish population 65 years of age or older received in-home help (6). Study I shows that 72 % of older adults with a low physical performance (30s-CST ≤ 8) reported a need for help with at least one activity, whereas 14 % of the older adults with high physical performance (30s-CST > 8) did the same. The results show that the acutely admitted elderly patients with reduced physical performance constitute a large proportion of older adults who may receive home care. In study I-II, about one third of the older adults with persistent reduced physical performance did not receive help, and for this reason were unknown to the primary sector administrators. In Study III, we found that this was the case for nearly 48% of the older adults discharged from the short-stay unit and in need of post-discharge rehabilitation. The result underscores the need for cooperation on rehabilitation between GPs, the municipalities, and the secondary sector.

The systematic functional assessment resulted in an increased number of referrals on post-discharge rehabilitation. If such assessment were implemented in the short-stay unit, municipal workloads would thus increase, just as a dedicated health professional would be needed in the hospitals. Regarding financial aspects and the level of implementation, it may also be beneficial to examine the effect of differentiated interventions that take into account the resources in this heterogeneous group of older adults at risk of loss of independence. In Study III, this heterogeneity was evident in the older adults' physical performance. The 30s-CST and the Barthel scores were higher for older adults discharged from the short-stay unit, compared to those transferred to another department.

Inspiration for differentiated interventions may be found in Coach2Move (187), an initiative whose aim is to stimulate physical activity in community-dwelling older adults with mobility problems. Motivational interviewing, clinical reasoning, coaching to increase physical activity and self-management are among its activities. Based on an assessment of the individual's level of physical difficulty, Coach2Move operates with three intervention profiles. For instance, an inactive patient with no physical barriers preventing physical activity will "only" require self-management coaching, whereas a person with acute or minor mobility problems may receive help in improving functions and activities, combined with self-management (187). Further studies inspired by the Coach2Move initiative are recommended, e.g., on differentiated models, including encouragement, self-management coaching, supervised walking, and follow-up activities.

Self-management coaching may be sufficient for some of the older adults discharged from the short-stay unit. Supervised walking and follow-up activities would be beneficial especially for older adults with few personal resources, incapable of initiating physical activity. Differentiated interventions may minimize the workload required for mobilization during and after the hospital stay.

4.6. Strengths and limitations

This project was based on two samples of older adults recruited within the first 48 hours of admission.

Studies I–III: Study population

It is a strength that the older adults were recruited from different municipalities, however, in all three studies, we assessed fewer patients for eligibility than were admitted to the short-stay unit in the ED. The difference is largely explained by organizational conditions. When recruitment took place, the short-stay unit had two locations. For Studies I and II, only patients admitted to one of the addresses were assessed; for Study III, assessment took place at both addresses, which exposed the procedure to sickness absence, holidays, etc. These reasons relate entirely to organizational issues and had no influence on the selection. However, the fact that recruitment took place only Mondays through Fridays may have left out some of the frailest patients, who are admitted during weekends when GP clinics are closed.

The median age interval in all three studies was 76–78 years of age. Despite an older age than expected, the 65 years or older as inclusion criterion is considered appropriate. It corroborates other studies (45,157,179) and are in accordance to studies that combine age with screening criteria or functional problems (67). The cut-off point furthermore corroborates the Medline MESH term age (65 through 79 years of age).

As a result of our inclusion and exclusion criteria, the external validity are quite narrow, namely only mentally fit older adults with walking ability at baseline and reduced physical performance at hospital admission. However, older adults receiving home care may have been underrepresented, as one of the reasons for declining to participate was "too many home care visits".

In Studies I–II, (13%) (5/39) died during the study period; the RCT sample saw a decease rate of 23% (14/64). These are much higher mortality rates than the 5.1% (34/667) in frail older adults 90 days after admission to an acute medical unit (26). Despite our efforts to exclude patients too ill for physical activity, etc., we failed to exclude the life-ending older adults (the criterion was ability to sit independently within the first 48 hours). The results support the need for a comprehensive geriatric assessment of older adults with complex medical problems.

Studies I–III: Data collection

Regarding the collection of data, we consider it a strength that identical methods were used at baseline and at follow-up, and that the physiotherapist and the project assistants collecting the follow-up data were unaware of the baseline data.

We tested inter-rater reliability on the two project physiotherapists who collected the data for the cohort study and the baseline data in the RCT. The result showed acceptable intra-class correlation ($ICC_{2.1}$) for the 30s-CST and the DEMMI. We did not test inter- rater reliability for Barthel between the project physiotherapists. The test should ideally have been carried out. We did not test the reliability between the project physiotherapists and the project assistants or between the project assistants. Such tests should ideally have performed, but this proved impracticable, as several project assistants were involved in the collection of follow-up data for the RCT. This poses a risk of variation in the data collection, which we tried to minimize by letting the project physiotherapists introduce all project assistants, and by securing the alignment of data collection in two meetings between assistants and physiotherapist.

In the cohort study, the follow-up visit to the patient's home occurred 34 days (IQR 27–40 days) after admission, somewhat later than the planned 14 days. The delay was caused partly by the very active lifestyle of some patients, partly by the delayed discharge of other patients. Based on this, we assume the delay was beneficial, as the assessment offers a more stable reflection of physical performance.

Study I: The 30s-CST

The number of patients with a 30s-CST > 8 being lower than expected, however the construct validity was not influenced. It may be considered a limitation that the study of concurrent validity and responsiveness to change included only older adults with 30s-CST scores ≤ 8. If older adults with 30s-CST scores > 8 had been included, a wide variety of different 30s-CST scores would probably have appeared among the older adults with a DEMMI score = 100.

Study II: A prediction model

The low number of events restricted the number of potential predictors that could be passed on from the univariate analysis to the multivariate analysis, and thus the opportunity for identifying predictors associated with the outcome. Moreover, the prediction model was based on a single sample size, making it necessary to verify the prediction model in a different and larger population. Although the 30s-CST using eight as cut-off point is validated only for active, community-dwelling citizens, we accepted this limitation, as the follow-up was performed in the patient's home.

Study III: The RCT

The quality of a clinical trial is typically assessed by the risk of bias: selection bias, performance bias, detection bias, attrition bias, and reporting bias (188).

This study succeeded in minimizing the risk of systematic difference regarding selection bias, attrition bias, and reporting bias. The study involved random sequence generation as well as allocation concealment and no differences were found between the four groups. There was no significant difference between withdrawals, and the publishing of the study protocol prevents selective reporting. However, external validity would have benefitted from a detailed description of interventions in the study protocol.

Since blinding of patients and of the physiotherapist who performed the systematic functional assessment was impossible, performance bias and detection bias cannot be ruled out. The baseline data were collected before randomization, and bias is thus excluded. As the results of the randomization were afterwards given to the patients, involving a risk that nurses and physicians in the short-stay unit and the project assistants collecting the follow-up data were biased. However, the risk of detection bias was minimized, since the person collecting follow-up data had no knowledge of previous data, and was instructed not to ask for the information.

Despite this assessment of risk of bias, the RTC study has several limitations.

In our study, the patients who were discharged from the short-stay unit and those who were transferred to another department provided a large within-variance. The between-group variance was small, since systematic functional assessment and usual assessment was similar on several components, especially because of the poor implementation of mobilization. The between-group variance was also influenced by the low adherence to the protocol on immediate rehabilitation and

the number of referrals on post-discharge rehabilitation. A large within-variance and a small between-variance provide a small effect size. In study III the effect size is 0.34, which is considered a small effect size (170).

Sample size

The sample size was calculated based on two groups, however used in a design with four groups. The following formula is usable if one compares four groups and want at least to detect a difference of 2 repetitions in the 30s-CST (corresponding to MDC_{90} for the 30s-CST) (169), e.g. in the first two groups: n_pergroup = (`z_alpha' + `z_beta')^2 * (2 * `vgroup') / `mdiff'^2. Based on this formula the number of patients required for all four group = 251 including 30% drop-out the sample size was 324, which is lower than the sample size based on the first calculation.

Nevertheless, the sample size ought to be based on the number of referrals on post-discharge rehabilitation, since this number is crucial for obtaining sufficient power to identify a difference if it exists.

Outcome measures

The selected outcome measures were the 30s-CST≤ 8, 30s-CST, the Barthel, and EQ-5D-3L.

When the studies were planned, a floor effect regarding the 30s-CST was expected. The floor effect found in this study was nevertheless much stronger than expected. Its handy format for use in a short-stay unit and at follow-up still gives the 30s-CST an advantage. Additionally, although the floor effect hampered the observation of changes among the lowest performing older adults, we were able to demonstrate improvement in the majority of patients from admission to follow-up. Another upside of the 30s-CST was the proxy measurement of lower body strength, which is associated with ADL (108-110,112).

As is it often used in medical patients in Denmark, the Barthel was selected, despite its demonstrated ceiling effect (189,190). This impedes observation of improvement, thus making it a less than ideal measurement tool for older adults who are independent in BADL. As a last concern, we should mention that using self-reported information in a short-stay unit poses the risk that the patient's answers reflect the habitual rather than the current functional ability, and that physical performance is overestimated.

<u>The literature search</u>

The literature search identified no studies that fulfilled the criteria for functional assessment on patients discharged within 72 hours. The search criteria were limited by the focus on the effect, as it implies randomized clinical trials; this limitation is minimized, however, by the broad search profile used in the second strategy. Another limitation was the inclusion criteria: discharge within 72 hours. It would have been preferable to include studies focusing on functional assessment provided within a certain period, e.g. 48 hours.

5. Conclusion

Our particular focus was on acutely admitted medical older adults with reduced physical performance at admission. The project documented a significant difference in ADL in patients with low physical performance (30s-CST ≤ 8), compared to patients with high physical performance (30s-CST > 8). We moreover showed that, compared to the DEMMI, the 30s-CST proved an acceptable tool for the assessment of physical performance in acutely admitted older adults at admission. Despite the DEMMI's superior responsiveness to change, especially in older adults with low physical performance, the ability of the 30s-CST to measure improvement in physical performance during hospitalization and its relevance for ADL makes it the outcome measurement of choice. A prediction model based on age, gender, walking aid use, and 30s-CST scores ≤ 5 enabled the clinicians to identify 78% of older adults with continued reduced physical performance following acute hospitalization. In older adults with reduced physical performance at admission, a systematic functional assessment at admission followed by immediate rehabilitation showed no significant difference.

6. Perspectives

This project has focused on the identification of acutely admitted medical older adults with either persistent reduced physical performance one month after admission or in need of physical activity during and after the hospital stay.

This project has validated an easy-to-use physical performance measurement tool, which it is hoped will improve the assessment of acutely admitted older adults with nonsurgical complaints. Moreover, the project has shown that, even though the patient's condition at admission is affected by the presenting illness, it is possible to identify those patients who have persistent reduced physical performance and who are therefore prone to inactivity during and after the hospital stay. The usability of performing the systematic functional assessment within the first 48 hours was also demonstrated.

In line with other studies, we found that a dedicated staff is apparently required to ensure mobilization during the hospital stay. Exploration is required to examine the reasons behind difficulties with immediate rehabilitation. Further research is also needed on the different models employed in the primary and the secondary sectors, as illustrated by the difficulties occurring in the transition. Interventions to encourage the patients to activity during their hospital stay, followed by post-discharge visits by hospital staff, appear to be beneficial.

The implementation of interventions may be improved if future research on transition models takes into account the heterogeneity of the group of older adults as exemplified by the differences between discharged patients and transferred patients. At the organizational level, mobilization

during hospitalization and changes in post-discharge rehabilitation are vital to maintain physical performance in acutely admitted older adults.

Only if the increase in life expectancy is accompanied by stimulating older adults to enjoy the highest possible level of independence and participation in society can we support healthy ageing and stem the rising costs of the health system (5).

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8. Papers and manuscripts

Paper I

Validity and Responsiveness to Change of the 30-second Chair Stand Test in Older Adults Admitted to an Emergency Department

Validity and Responsiveness to Change of the 30-Second Chair-Stand Test in Older Adults Admitted to an Emergency Department

Inge Hansen Bruun, PT, MR[1,2]; Christian B. Mogensen, MD, PhD[3,4]; Birgitte Nørgaard, PhD[5]; Berit Schiøttz-Christensen, MD, PhD[6,7]; Thomas Maribo, PT, PhD[8,9]

ABSTRACT

Background and Purpose: Few physical performance measurement tools are validated for acutely admitted older adults, and for this reason we aimed to examine the validity and responsiveness to change of the 30-second Chair-Stand Test (30s-CST) used to assess physical performance in older adults admitted to a short-stay unit in an emergency department.

Methods: Construct validity of the 30s-CST, using 8 as a cutoff point for dependency in activities of daily living, was examined using 207 patients. Self-reported information on everyday activities was obtained by asking patients about need for help in bathing, dressing, cooking, cleaning, and shopping. Concurrent validity of the 30s-CST compared with the de Morton Mobility Index (DEMMI) on physical performance of acutely admitted older adults was examined with 156 patients. The analysis of concurrent validity included the entire DEMMI and 2 subsets of DEMMI: "DEMMI walking" and "DEMMI dynamic balance." The responsiveness to change in the 30s-CST compared with DEMMI was examined with 117 patients. All patients were classified as having either low physical performance (30s-CST ≤8) or high physical performance (30s-CST >8); these groups were used in the analysis of validity and responsiveness to change.

Results and Discussion: Regarding construct validity using 8 as a cutoff point, the study showed a significant difference between patients with low physical performance compared with patients with high physical performance. Moreover, a decrease in the 30s-CST was followed by an increase in the need for help with everyday activities. There was a significant association between the 30s-CST and DEMMI (r = 0.72); for every extra repetition in the 30s-CST, the DEMMI score increased by 4.9. There was a significant association between the 30s-CST and the 2 subsets "DEMMI walking" and "DEMMI dynamic balance"; yet, a pronounced floor effect was found in the subsets. The analysis demonstrated a very wide prediction interval, indicating that DEMMI has a better responsiveness to change than the 30s-CST, especially in older adults with low physical performance. However, the 30s-CST is easier and faster to use than DEMMI.

Conclusion: This study found a significant difference in the patients' need for help with everyday activities when comparing low and high physical performance groups. The concurrent validity of the 30s-CST was acceptable in assessing physical performance in older adults at the time of admission; the 30s-CST is thus a tool that is easy to use in older adults with acute disease. In contrast, based on very wide prediction intervals, DEMMI demonstrated better responsiveness to change than the 30s-CST, especially in older adults with low physical performance.

Key Words: acutely admitted older adults, physical performance, responsiveness to change, 30-second Chair-Stand Test, validity

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[1]*Department of Physiotherapy and Occupational Therapy, Lillebaelt Hospital, Kolding, Denmark.*

[2]*Department of Regional Health Research, University of Southern Denmark, Odense, Denmark.*

[3]*Emergency Department, Hospital of Southern Jutland, Aabenraa, Denmark.*

[4]*Department of Regional Health Research, University of Southern Denmark, Odense, Denmark.*

[5]*Department of Public Health, University of Southern Denmark, Odense, Denmark.*

[6]*Spine Centre of Southern Denmark, Lillebaelt Hospital, Middelfart, Denmark.*

[7]*Department of Regional Health Research, University of Southern Denmark, Odense, Denmark.*

[8]*Department of Public Health, Aarhus University, Aarhus, Denmark.*

[9]*DEFACTUM, Central Denmark Region, Aarhus, Denmark.*

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Address correspondence to: Inge Hansen Bruun, PT, MR, Department of Physiotherapy and Occupational Therapy, Lillebaelt Hospital, Sygehusvej 24, 6000 Kolding, Denmark (Inge.Hansen.Bruun@rsyd.dk).

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INTRODUCTION

Older adults constitute a large proportion of the patients in the emergency department's (ED's) short-stay unit.[1] A short-stay unit provides targeted care for 48 to 72 hours—a

critical period for non–disease-specific assessment of physical performance.[2] Despite the importance of physical performance assessment in predicting limitations in mobility, length of stay, and discharge destination,[3-5] only a few physical performance measures for acutely admitted older adults are validated. In addition, the validated performance measures are time consuming due to their many items.[6,7]

The 30-second Chair-Stand Test (30s-CST) is a single-item physical performance tool for the assessment of lower body strength. It is performed by counting the number of stands completed in 30 seconds with hands crossed against the chest.[8] The simplicity of the test makes it easy to use, requiring less than 5 minutes.

The loss of muscle mass and reduced functional reserve capacity entailed by the aging process usually lead to reduced physical performance and functional decline.[9] In active community-dwelling older adults, a cutoff point (30s-CST ≤8) has demonstrated its ability to identify community-dwelling older adults at risk of functional decline in their later years.[10] Acutely admitted older adults with low physical performance can improve during hospitalization, but their physical performance nevertheless remains low at discharge.[11] In addition, low physical performance, as indicated by the inability to perform more than 5 chair stands, relates to risk of sarcopenia.[12]

Lower body strength and balance are keys to good mobility; the ability to rise from a chair with hands crossed against the chest at the time of admission is a good indicator of mobility limitations in older adults 30 days after hospital discharge.[3,13] The 30s-CST demonstrates a floor effect at the time of admission for acutely admitted older adults, indicating a poor responsiveness to change.[14] The cutoff point for floor and ceiling effects was defined, as greater than 15% of patients achieving the lowest or highest possible score.[15]

The de Morton Mobility Index (DEMMI), a frequently used multi-item instrument for measuring mobility and balance across the spectrum from bed-bound to independent mobility,[16] is a valid and reliable instrument, not only for acutely admitted older adults but also for subacute hospitalized older adults and community-dwelling older adults. No floor or ceiling effects are demonstrated.[6,17-19] A DEMMI assessment takes 10 to 15 minutes.[20]

We believe that the ease of use of the 30s-CST, as a single-item instrument, will stimulate the use of physical performance assessments of patients admitted to a short-stay unit in an ED. However, the 30s-CST has never been validated for this population. For this reason, this study aimed to examine the validity and responsiveness to change of the 30s-CST used to assess physical performance in older adults acutely admitted to a short-stay unit in the ED.

The objectives were to examine the instrument with regard to its

1. construct validity when using 8 as a cutoff point for dependency in activities of daily living,
2. concurrent validity when compared with DEMMI, and
3. responsiveness to change when compared with DEMMI.

METHODS

Design and Setting

We conducted a prospective cohort study in a short-stay unit at a Danish hospital from December 2014 to May 2015. The reporting of the study complies with the STROBE guidelines (Strengthening the Reporting of Observational Studies in Epidemiology).[21]

Study Participants

All patients were admitted to the short-stay unit on a weekday and screened for eligibility within the first 48 hours. The inclusion criteria were as follows: 65 years of age or older; admitted for "medical" reasons (as distinct from surgical or psychiatric reasons); oriented to time and place; able to sit on a chair independently; and able to speak and understand Danish. Patients who were unable to walk were excluded. All participants gave written consent to participate in the study.

Outcome Measures

Outcome measures were collected as physical performance measures and self-reported information on everyday activities.

Physical performance measures

The 30s-CST with a cutoff point of 8 or less is validated in community-dwelling older adults and compared with self-reported information on the basic activities of daily living (BADL), such as bathing and dressing, and instrumental activities of daily living (IADL), such as shopping and cleaning.[22] A clinimetric evaluation of the 30s-CST shows moderate concurrent validity when compared with leg-press performance and good interrater reliability in acutely admitted patients.[8,14] Moreover, the 30s-CST is easy to complete in a busy short-stay unit, as only an ordinary chair is required.[8] A minimal detectable change (MDC) of 2 has been determined for the 30s-CST.[23] Patients were classified as having either low physical performance (30s-CST ≤8) or high physical performance (30s-CST >8).

The de Morton Mobility Index is a valid and reliable physical performance measurement tool; we therefore consider it an appropriate reference standard.[6,17-19,24] The DEMMI assessment takes more than twice as long as the 30s-CST and requires more equipment and floor space as it also tests for the abilities to get out of bed, to go from sitting to standing position, and to walk a distance of 50 m.[16] de Morton Mobility Index is hierarchically structured, beginning with the easiest activity (sitting unsupported) and ending with the hardest (tandem standing with eyes closed). The maximum DEMMI score is 100; with reference to the hierarchical structure, no score higher than 53 points can be achieved without the ability to perform item 6: "sit to stand no arms." An MDC of 9 has been determined for DEMMI.[6] The focus of this study is older adults with functional decline or at risk of functional decline, and thus only patients in the group with low physical performance (30s-CST ≤8) performed the DEMMI test.

We expected an association between a low 30s-CST score and need for gait aids. We tested this relationship for 2 DEMMI subsets: "walking" (items 11 and 12) and "dynamic balance" (items 13, 14, and 15). The walking score includes independent walking with or without a gait aid. The "dynamic balance" tasks must be carried out without gait aids.[16]

Self-reported information on activity: Information on everyday activities, including bathing, dressing, cooking, cleaning, and shopping, was obtained by asking: "Can you bathe [dress, etc] without help, with help, or not at all?" with the following response options: "Without help," "With help," or "Cannot at all." The BADL were chosen as the focus of these questions as dressing and so on are basic activities, while IADL involve more demanding everyday tasks such as cleaning. With both instruments, the need for help in completing an activity was defined as dependency on assistance from another person. If help was needed, the response would be: "Need for help." If patients were unable to answer, the response field was left blank.

Data Collection

At admission: Eligible patients were first subjected to the 30s-CST, after which self-reported information on mobility and everyday activities was obtained. Inability to rise with hands crossed against the chest in the 30s-CST resulted in a score of 0; patients who completed the practice trial but were unable to rise with hands crossed over the chest in the test proper scored 1. The DEMMI protocol was followed, except for the "sit to stand no arms" (item 6), as this was covered by the 30s-CST.

Follow-up: A follow-up visit was carried out at the patients' homes no earlier than 14 days after the time of admission. Data were collected independently by 2 physiotherapists, first at admission and then at the follow-up. Interrater reliability was tested in a pilot study of 21 randomly selected patients admitted to the short-stay unit, showing acceptable reliability with an intraclass correlation ($ICC_{2,1}$) in the 30s-CST of 0.98 (95% confidence interval [CI]: 0.96-0.99) and in DEMMI of 0.87 (95% CI: 0.69-0.95).[25]

Data Analysis

Construct validity was tested using the following a priori hypotheses[26]:

1. Comparing patients with low physical performance (defined as 30s-CST ≤8) with patients with high physical performance (defined as 30s-CST >8), we expect a significant difference in need of help with everyday activities as measured by self-reported information.
2. With decreasing 30s-CST score, the relative number of patients in need of help with BADL will increase.

When analyzing construct validity, patients with high physical performance were not expected to need help with everyday activities; conversely, patients with low physical performance were expected to need help. In the analysis, the 2 response options "With help" or "Cannot at all" were collapsed, since both answers reflect the need for help. Fisher exact test was used for testing the hypothesis. Need for help with everyday activities was tested using 3 parameters: BADL, IADL, and help with at least 1 activity in BADL or IADL.

Concurrent validity was tested using the following a priori hypotheses[26]:

1. Test results from the 30s-CST and DEMMI will show significant correlation.
2. The 30s-CST and the 2 DEMMI subsets "walking" and "dynamic balance" will be significantly correlated.

When analyzing concurrent validity, the correlation coefficient and a scatterplot with the fitted values were prepared; only significant correlations are presented here ($P < .05$). Correlations above 0.70 were found acceptable.[25] The fitted value represents the β coefficient calculated by linear regression analysis. Prediction intervals (PIs) were calculated for DEMMI and for each 30s-CST score: A 95% PI is the interval in which observations are predicted to fall with a probability of 95%. If the variance in scores is high, the clinical value is low.[27]

Responsiveness to change was tested using the following a priori hypotheses[26]:

1. In more than 75% of the patients, changes in DEMMI scores between the time of admission and follow-up will be greater than the MDC.
2. In less than 50% of the patients, changes in 30s-CST scores between the time of admission and follow-up will be greater than the MDC.
3. In less than 50% of the patients with 30s-CST scores greater than 5 at admission, the changes in the 30s-CST score between time of admission and follow-up will be greater than the MDC.

Hypothesis testing and a criterion approach[15] were chosen because of the known floor effect in the 30s-CST using DEMMI as a criterion standard. Regarding hypothesis 1, we expected good responsiveness in DEMMI, meaning that the majority of older adults will experience a change greater than the MDC of 9.[6] Regarding hypothesis 2, we expected a floor effect in 30s-CST at the time of admission,[14] reflecting a reduced physical reserve capacity. Although patients with poor physical function are known to improve the most,[28] we expected less than half of the patients to experience a change greater than the MDC of 2.[23] Regarding hypothesis 3, a 30s-CST of 5 repetitions or less is an indicator of sarcopenia.[12] Conversely, patients performing more than 5 repetitions are less physically sensitive to the cause of hospitalization. Therefore, we expected less than half of the patients performing more than 5 repetitions to experience a change greater than MDC between time of admission and follow-up. When analyzing responsiveness to change, percentages were calculated in accordance with the hypothesis. In the criterion approach[15] we used the correlation between changes in 30s-CST and DEMMI

from the time of admission to follow-up. A scatterplot was prepared to illustrate changes in 30s-CST and the DEMMI.

The sample size calculation was based on our prospective study, which was designed with a view to a multivariate analysis. The sample size was n = 50 + 8*x*, where *x* is the number of independent variables. In the prospective cohort study, 10 independent variables and a 20% dropout was expected; 156 patients were therefore included.[29] We assumed that 40% of the recruited patients would have 30s-CST greater than 8; a sample size of 260 was thus scheduled for the study. Analysis was performed using STATA 14 (Stata Statistical Software, 2015, College Station,Texas).

The Regional Scientific Ethical Committees of Southern Denmark approved this study with a waiver (August 20, 2014). Written informed consent was obtained from all participants for the collection of information from the medical records, which is required according to Danish legislation. The project was registered with the Danish Data Protection Agency (2008-58-0035) and on ClinicalTrials.gov with the identifier: NCT02474277 (October 12, 2014).

RESULTS

Overall, 820 patients were admitted to the short-stay unit during the recruitment period. Construct validity was assessed using data from the 207 included patients; concurrent validity was assessed using data from the 156 patients with low physical performance (30s-CST ≤ 8) and this group performed DEMMI. At the follow-up visit, 39 patients (25%) had dropped out, leaving data on 117 patients for the responsiveness-to-change analysis. The follow-up visit was carried out a median of 34 days (interquartile range: 27-40) after the day of admission. A flowchart of inclusions, reasons for exclusion, and loss to follow up are given in Figure 1.

No significant differences were found between the patients lost to follow-up and the completers, except for independent walking ability, where 25 of the 39 (64%) dropouts had no independent walking ability compared with 50 of the 117 (43%) completers (P = .02). Characteristics of the 207 included patients are provided in Table 1, as are their characteristics at the time of admission in accordance with outcome status at follow-up.

Information on physical performance at baseline is provided in Supplemental Digital Content Table 1, available at: http://links.lww.com/JGPT/A13.

Construct Validity

As hypothesized, a significant difference was detected for everyday activities when patients with low physical performance (30s-CST ≤8) were compared with patients with high physical performance (30s-CST >8) (P < .01) (see Table 2). Moreover, Figure 2 shows that the proportion of patients in need of help with BADL and IADL decreased with increasing physical performance, as measured by the 30s-CST.

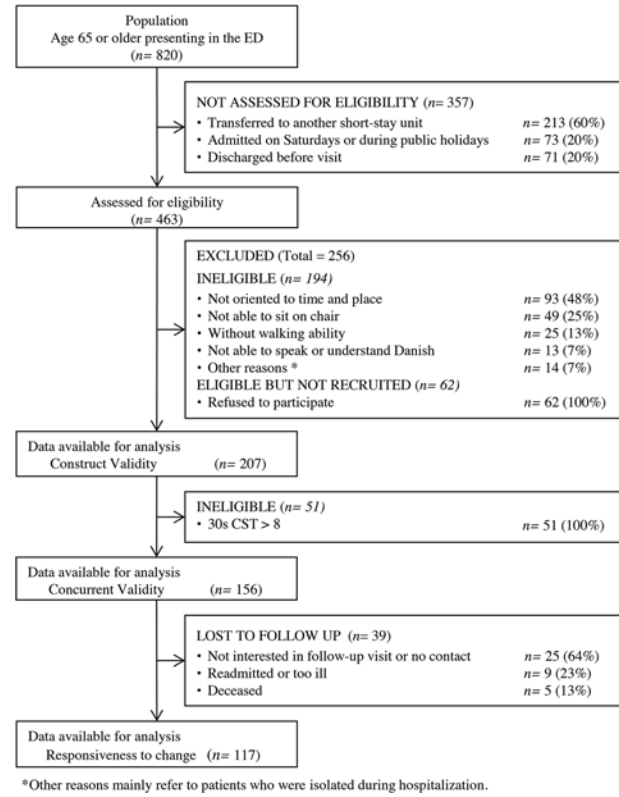

Figure 1. Flowchart for the inclusion process.

Concurrent Validity

The results demonstrated a significant acceptable correlation (r = 0.72) (P < .001) between DEMMI and the 30s-CST. The regression analysis showed an increase in the DEMMI score of 4.9 for each additional repetition in the 30s-CST (β-coefficient: 4.9, 95% CI: 4.1-5.7). Figure 3 and Table 3 illustrate a wide DEMMI PI, indicating several different DEMMI scores for each 30s-CST score, which points to the inappropriateness of attempting to predict patients' DEMMI scores on the basis of 30s-CST scores. The scope and quantity of circles in Figure 3 illustrate a clear floor effect in the 30s-CST, with 94 (60%) patients having a 30s-CST score of 0 and a DEMMI score between 0 and 62.

With regard to the DEMMI subsets "walking" and "dynamic balance," the correlation to the 30s-CST was r = 0.55 (P < .001) and r = 0.69 (P < .001), respectively. Although significant, this result was lower than the acceptable level of 0.70. The very large circle formed by the scatterplots shown in Figures 4a and 4b demonstrates a clear floor effect in the 2 DEMMI subsets and the 30s-CST ; 33% of patients had a 0 score for both the 30s-CST and DEMMI "walking"; the proportion was 46% for DEMMI "dynamic balance."

Responsiveness to Change

Responsiveness was tested by 3 hypotheses: (1) changes in DEMMI scores were higher than the MDC in more than 75% of the patients; (2) changes in the 30s-CST were

Table 1. Sample Characteristics for All Patients at the Time of Admission

Characteristic	All Participants (n = 207)		Admission Characteristics in Accordance With Outcome Status at Follow-up			
			30s-CST ≤8 (n = 156)		30s-CST >8 (n = 51)	
Age median (IQR)	76 (71-84)		78 (71-85)		73 (70-78)	
	n	%	n	%	n	%
Gender, female	119	57	88	56	31	61
Living arrangement						
Alone	112	54	89	57	23	45
Cohabiting	92	44	64	41	28	56
Nursing home	3	1	3	2		
Education						
No education	76	37	63	40	13	25
Vocational or short-term training	93	45	69	44	24	47
Medium/long/other education	38	18	24	15	14	27
Self-reported information on activity						
Self-rated health (n = 206)						
Excellent/very good/good	147	71	102	66	45	88
Less good/poorly	59	29	53	34	6	12
Using walking device indoors						
All the time	35	17	34	22	1	2
Sometimes	32	15	31	20	1	2
Not at all	140	68	91	58	49	96
Using walking device outdoors						
All the time	62	30	58	37	4	8
Sometimes	18	9	18	12		
Not at all	119	57	72	46	47	92
Not going out	8	4	8	5		
Climbing a flight of stairs						
Without difficulty	110	53	68	44	42	82
With some difficulty	27	13	21	13	6	12
With much difficulty	15	7	15	10		
Cannot	55	27	52	33	3	6
Walking 400 m						
Without difficulty	112	54	71	46	41	80
With some difficulty	25	12	18	12	7	14
With much difficulty	13	6	12	8	1	2
Cannot	57	28	55	35	2	1

Abbreviations: IQR, interquartile range; 30s-CST, 30-second Chair-Stand Test.

higher than the MDC in less than 50% of the patients; (3) changes in 30s-CST from admission to follow-up will be greater than the MDC in less than 50% of the patients with 30s-CST greater than 5 at admission. As Table 4 shows, neither of the first 2 hypotheses was corroborated by the results, whereas the results confirmed the third hypothesis.

The results for changes in the 30s-CST and DEMMI between admission and follow-up are presented in Figure 5. The plot demonstrates a wide range of changes in DEMMI for each 30s-CST score, especially in patients who were unable to rise with hands crossed against the chest (30s-CST = 0). The result is in accordance with the low

Table 2. Construct Validity on the 30s-CST ≤8 and Risk of Loss of Functional Mobility

	30s-CST ≤8 (n = 156)		30s-CST >8 (n = 51)		
Everyday Activities	n	%	n	%	*P*
Need help with dressing	17	11	0	0	.01
Need help with bathing	31	20	0	0	<.001
Need help with cooking	47	30	1	2	<.001
Need help with cleaning	98	63	5	10	<.001
Need help with shopping	76	49	4	8	<.001
Need help with at least 1 BADL	34	16	0	100	<.001
Need help with at least 1 IADL	110	71	7	14	<.001
Need help with at least one activity	112	72	7	14	<.001

Abbreviations: BADL, basic activities of Daily Living; IADL, instrumental activities of Daily Living; 30s-CST, 30-second Chair-Stand Test.

correlation ($r = 0.43$) ($P < .001$) between the changes in DEMMI and the 30s-CST.

Overall, 78 (67%) of the patients improved their 30s-CST scores during the median 34 days from the time of admission until follow-up; 35 (30%) had unchanged scores, while 4 (3%) scored lower. In DEMMI, 88 (75%) showed improvement, 13 (11%) saw no change, and 16 (14%) had lower scores. Sixty-nine of the 117 (59%) patients were unable to perform a 30s-CST at admission; at follow-up, 34 of 117 (32%) patients were unable to rise. Moreover, 19% saw a mean improvement of 11 in their 30s-CST. These results indicate better responsiveness to changes in DEMMI than the 30s-CST.

DISCUSSION

Among patients admitted to a short-stay unit in an ED, this study showed a significant difference between patients with high and low physical performance, as measured by the 30s-CST, and their need for help with everyday activities at the time of admission. A significant association ($r = 0.72$) between the DEMMI and 30s-CST scores indicates the suitability of the 30s-CST for the assessment of physical performance in older adults at the time of admission. Although the wide PI precludes a reliable prediction of the DEMMI score based on the 30s-CST score, it indicates a better responsiveness to change in DEMMI than in the 30s-CST.

Construct Validity

Our study showed a significant difference in help needed with everyday activities between patients with low physical performance and those with high physical performance. It is reasonable to assume that a patient's physical performance reflects his or her poor condition at admission, at which time about half of the patients were unable to perform the 30s-CST; by the follow-up, this proportion had dropped to a third. This demonstrates the need for further assessment of patients with a 30s-CST of 8 or less in order to determine whether they are currently in need of

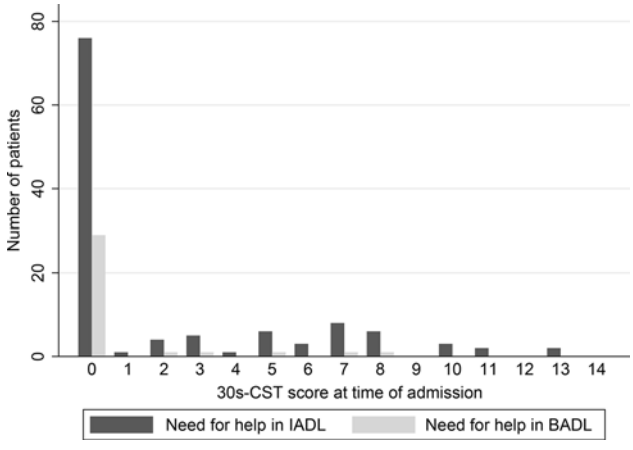

Figure 2. Proportion of patients needing help with BADL or IADL in accordance with the 30s-CST score. BADL indicates basic activities of daily living; IADL, instrumental activities of daily living; 30s-CST, 30-second Chair-Stand Test.

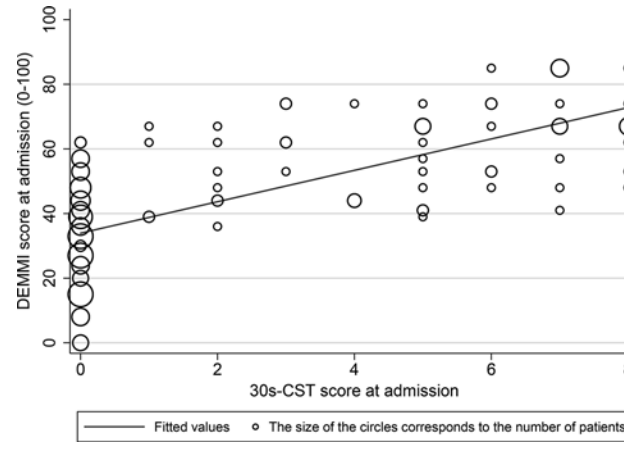

Figure 3. DEMMI and 30s-CST scatterplot. DEMMI indicates de Morton Mobility Index; 30s-CST, 30-second Chair-Stand Test.

Table 3. DEMMI Score and Prediction Interval for Each of the 30s-CSTs at Admission

DEMMI[a] Score	30s-CST=1	30s-CST=2	30s-CST=3	30s-CST=4	30s-CST=5	30s-CST=6	30s-CST=7	30s-CST=8
Mean	52	51	65	52	57	65	70	66
95 % PI	23-81	29-72	47-83	22-81	33-81	38-92	41-99	46-86

Abbreviations: DEMMI, De Morton Mobility Index; PI, prediction interval; 30s-CST, 30 second Chair-Stand Test.
[a]De Morton Mobility Index (0-100).

help with everyday activities or whether their low physical performance is due to the cause of hospitalization. Data on received physical therapy during and after the hospitalization would have improved the possibilities for assessing whether the improvements were related to improved physical performance or whether their improvements were related to recovering from the illness causing the hospitalization. Future research can advantageously examine reasons for improvement.

The aging process entails a loss of muscle mass and decreasing functional reserve capacity, usually followed by reduced physical performance and functional decline. Moreover, the patient's deterioration is typically reflected by a loss of ability to perform the IADL, followed by a deterioration in the ability to perform the BADL.[9,30] The results of this study confirm this general progression and thus the appropriateness of using the value of 8 as a cut-off point for hospitalized older adults. Across all levels of physical performance, as measured by the 30s-CST, more patients needed help with IADL than with BADL (Figure 2). At the time of admission, only 14% of the patients with high physical performance reported a need for help with IADL, while none reported a need for help with BADL. The corresponding figures for patients with low physical performance were 71% and 16%. These differences were supported by the self-reported information. At baseline, the majority of high performers were able to climb a flight of stairs and walk 400 m without difficulty; conversely, only half of the patients with low physical performance had the same ability.

We found that 31% of those patients who were unable to perform the 30s-CST reported a need for help with BADL, demonstrating a link between being unable to rise and needing help with BADL. Gill et al[31] tested whether community-dwelling older adults' physical performance at a 1-year follow-up could identify individuals at increased risk of functional dependence. The participants were independent in BADL at the baseline, and the study demonstrated that older adults who were unable to rise with hands crossed against the chest were at increased risk of a decline in BADL. Such inability can identify some patients in need of help with BADL; however, further research is needed as the inability to rise with hands crossed against the chest identified only 31% of those currently in need of help with BADL.

Concurrent Validity

Our study demonstrated a significant association between performance in the 30s-CST and in the DEMMI at the time

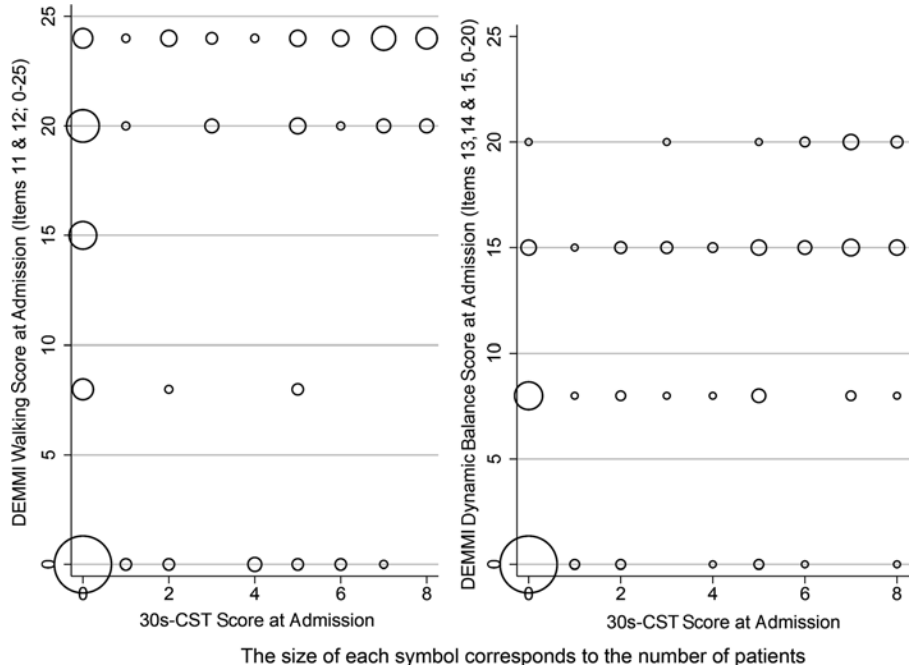

Figure 4. Scatterplots of (a; left) DEMMI "walking" and 30s-CST, and of (b; right) "DEMMI dynamic balance" and 30s-CST. DEMMI indicates de Morton Mobility Index; 30s-CST, 30-second Chair-Stand Test.

Table 4. Responsiveness to Change

Hypotheses	At Admission Mean (SD)	At Follow-up Mean (SD)	n	%
Changes in DEMMI[a] scores between time of admission and follow-up were higher than MDC[b] in more than 75% of the patients.	45.6 (18)	61.2 (16)	72	62
Changes in 30s-CST scores between time of admission and follow-up were higher than MDC[b] in <50% of the patients.	2.2 (3)	5.9 (5)	71	61
In <50% of the patients with a 30s-CST >5 at admission, the changes in 30s-CST scores between time of admission and follow-up were higher than MDC.	7 (1)	10 (3)	19	16

Abbreviations: DEMMI, De Morton Mobility Index; MDC, minimal detectable change; 30s-CST, 30-second Chair-Stand Test.
[a]De Morton Mobility Index (0-100).
[b]MDC for DEMMI: 9. MDC for 30s-CST: 2.

of admission, indicating that the 30s-CST is an appropriate tool for assessing physical performance in older adults admitted to a short-stay unit. For all 30s-CST scores, we demonstrated a wide PI in DEMMI; since this nearly covers the entire range of DEMMI, the use of the 30s-CST to predict DEMMI scores is of little clinical relevance.

In relation to the DEMMI hierarchy, a patient who is unable to perform the "sit to stand no arms" item (item 6) cannot be given a score above 53 points, indicating limited mobility. In our study, approximately 15% of the patients were unable to perform the 30s-CST and yet were able to walk without aids; their performance thus did not adhere to the expected hierarchy, which was established to provide goals for therapeutic interventions by identifying items that patients, against expectations, are unable to perform.[20] In accordance with the presumed influence of the cause of hospitalization on physical performance, a follow-up assessment or additional information is needed in order to provide reliable goals for an intervention. The original DEMMI study included only acutely admitted older adults with an expected stay of at least 48 hours.[20] The present study included patients discharged within the first 48 hours—a difference that may imply greater variation in physical performance and affect the hierarchy.

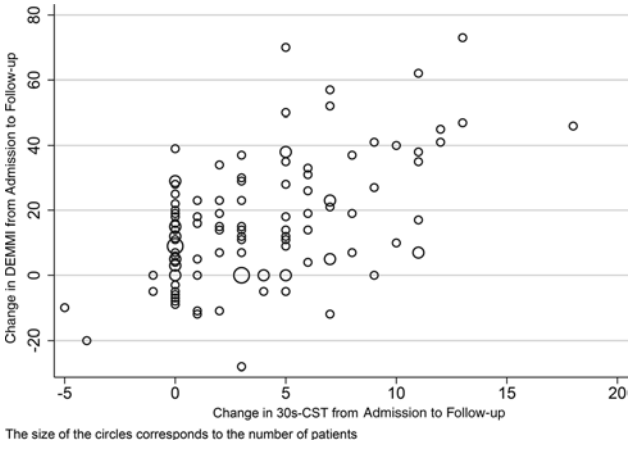

Figure 5. Changes between admission and follow-up in 30s-CST and DEMMI. DEMMI indicates de Morton Mobility Index; 30s-CST, 30-second Chair-Stand Test.

The floor effect in the DEMMI "walking" and "dynamic balance" items demonstrates that a large proportion of patients were unable to perform the 30s-CST and had difficulties with "walking" or "dynamic balance"; this information is concealed by the total DEMMI score. This situation should be remedied, as such information is crucial for avoiding falls during hospitalization.[32]

When space and time are limited, the ease of use and speed of the 30s-CST make it ideal for clinical settings. The implementation of the 30s-CST in the short-stay unit would offer important knowledge of physical performance at an early stage of hospitalization, information that would be highly useful in identifying vulnerable patients as well as allowing for continuous measurement during and after hospitalization.

Responsiveness to Change

Our expectation that more than 75% of the patients would improve their DEMMI scores above the MDC was not fulfilled, as only 62% did so. In the 30s-CST, we had expected fewer than 50% to experience above-MDC changes; however, the results showed 61% to have achieved this level of change. A study of geriatric inpatients (>65 years) has demonstrated that whereas initial high performers' changes are reflected by test scores in the 30s-CST, changes in initially poorly performing patients are best reflected in the DEMMI scores.[33] We believe that the difference between the expected and obtained proportion of DEMMI changes may be explained by its higher sensibility to low-scale performances below the MDC threshold. In the 30s-CST, habitual physical performance was high in 19% of patients, as they improved markedly; moreover, another 30% of patients improved sufficiently to gain the ability to rise with hands crossed against the chest.

Of our original 3 hypotheses, only 1 was confirmed; however, the scatterplot of changes from admission to follow-up demonstrates a rather wide PI for each 30s-CST score, which indicates a better responsiveness in DEMMI than in the 30s-CST. The data also show a wide range of DEMMI scores related to the large number of patients with a 30s-CST score = 0, likewise proving DEMMI's superior responsiveness, in particular, for poorly performing patients. This result is very much in line with the aforementioned study.[33]

Strengths and Limitations

The strengths of this study are its sample size and the use of physical performance measurement upon admission to the short-stay unit and at follow-up some weeks after hospitalization. A further strength lies in entertaining a priori hypotheses, since this prevents the formulation of hypotheses based on the results. The use of self-reported information is weakened by the use of individual questions rather than a validated questionnaire. However, uses of individual questions correspond to usual practice.

We selected the 30s-CST despite its known floor effect for acutely admitted older adults.[14] The well-known "sit-to-stand five times" test[7] could be an alternative, but this would entail an even larger floor effect, as 73% were unable to complete that test, compared with 60% in the case of the 30s-CST (see Supplemental Digital Content Table 1, available at: http://links.lww.com/JGPT/A13). Further research is needed to address the floor effect in the 30s-CST at the time of admission. This may involve a combination of physical performance measures and self-reported information on the older adults' physical performance in daily life.

Our restricted focus—the assessment of concurrent validity included only older adults with low physical performance at the time of admission—can be seen as a limitation. This in spite of the fact that the majority of older adults with high physical performance (30s-CT > 8) manage everyday activities independently.

In the present study, the ICC in DEMMI was 0.87 (95% CI: 0.69-0.95), a figure lower than that found in a study of geriatric inpatients (0.91; 95% CI: 0.811-0.957).[33] The differences in these results may have been caused by the necessity of testing reliability on patients with no changes, which leaves only a few hours for retesting our population of acute patients, introducing a risk of recall of their previous result and thereby prompting a desire to improve their performance.

In terms of external validation, a selection bias may be present, as 55% of the older adults were not assessed for eligibility; however, this was entirely due to organizational conditions, such as transferrals. A total of 20% of the older adults refused to participate, either because they felt the project was irrelevant to them, or because they could not contemplate more visits than were already entailed by their need for home help. The results of this study should be generalized only to older "medical" patients, as distinct from patients admitted for surgical or psychiatric reasons. A further condition is that they must be oriented to time and place and with low physical performance at admission.

CONCLUSION

This study demonstrates significant variation in the need for help with everyday activities in acutely admitted older adults. To operationalize the decision process, we recommend using a cutoff point of 8 in the 30s-CST to distinguish between patients with low physical performance and those with high physical performance. The study also found a significant association between the scores of the 30s-CST and DEMMI at the time of admission. Each extra repetition in the 30s-CST was followed by an increase in the DEMMI score, thus making the 30s-CST well suited for assessment of physical performance at the time of admission. The acceptable validity implies a good possibility of implementing the 30s-CST in acute settings with limited time and space for testing, such as examination rooms and short-stay units.

However, the wide PI found here prevents us from predicting a patient's DEMMI score on the basis of the 30s-CST score. With regard to responsiveness to change, the wide PI demonstrated a better responsiveness in DEMMI than in the 30s-CST, which leads us to recommend DEMMI over the 30s-CST in evaluation studies, especially of older adults with low physical performance.

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Paper II

A prediction model to identify hospitalised, older adults with reduced physical performance

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BMC Geriatrics

A prediction model to identify hospitalised, older adults with reduced physical performance

Inge H. Bruun[1,2*], Thomas Maribo[3,4], Birgitte Nørgaard[5], Berit Schiøttz-Christensen[2,6] and Christian B. Mogensen[2,7]

Abstract

Background: Identifying older adults with reduced physical performance at the time of hospital admission can significantly affect patient management and trajectory. For example, such patients could receive targeted hospital interventions such as routine mobilisation. Furthermore, at the time of discharge, health systems could offer these patients additional therapy to maintain or improve health and prevent institutionalisation or readmission. The principle aim of this study was to identify predictors for persisting, reduced physical performance in older adults following acute hospitalisation.

Methods: This was a prospective cohort study that enrolled 117 medical patients, ages 65 or older, who were admitted to a short-stay unit in a Danish emergency department. Patients were included in the study if at the time of admission they performed ≤8 repetitions in the 30-s Chair-Stand Test (30s–CST). The primary outcome measure was the number of 30s–CST repetitions (≤ 8 or >8) performed at the time of follow-up, 34 days after admission. Potential predictors within the first 48 h of admission included: age, gender, ability to climb stairs and walk 400 m, difficulties with activities of daily living before admission, falls, physical activity level, self-rated health, use of a walking aid before admission, number of prescribed medications, 30s–CST, and the De Morton Mobility Index.

Results: A total of 78 (67%) patients improved in physical performance in the interval between admission and follow-up assessment, but 76 patients (65%) had persistent reduced physical performance when compared to their baseline (30s–CST ≤ 8). The number of potential predictors was reduced in order to create a simplified prediction model based on 4 variables, namely the use of a walking aid before hospitalisation (score = 1.5), a 30s–CST ≤ 5 (1.8), age > 85 (0.1), and female gender (0.6). A score > 1.8 identified 78% of the older adults who continued to have reduced physical performance following acute hospitalisation.

Conclusion: At the time of admission, the variables of age, gender, walking aid use, and a 30s–CST score ≤ 5 enabled clinicians to identify 78% of older adults who had persisting reduced physical performance following acute hospitalisation.

Trial registration: ClinicalTrials.gov Identifier: NCT02474277. (12.10.2014).

Keywords: Reduced physical performance, Prediction model, Physical activity

* Correspondence: Inge.Hansen.Bruun@rsyd.dk
[1]Department of Physiotherapy, Lillebaelt Hospital, University of Southern Denmark, Kolding, Odense, Denmark
[2]Department of Regional Health Research, University of Southern Denmark, Odense, Denmark
Full list of author information is available at the end of the article

Background

Activities of daily living are essential for maintaining independence and for participating in meaningful activity. For older adults, and especially frail, older adults, hospitalisation poses a risk of triggering persistent functional decline, largely by ushering in a period of reduced activity [1–3]. Despite this foreknowledge, older adults who are admitted to medical departments continue to spend more time lying in bed than sitting, standing, or walking [4–7].

The ageing process entails a loss of muscle mass, followed by reduced physical performance and functional decline [1, 8]. In order to mitigate the risk of accelerating this process, it is important to identify frail, older adults at or near the time of hospital admission. This would permit the application of targeted hospital interventions, such as routine patient mobilisation, that can be used to prevent physical decline. Furthermore, at the time of discharge, health systems can elect to offer such patients additional therapy or supports with the intent of maintaining and improving health and preventing institutionalisation or readmission.

However, identifying such patients is challenging, largely because valid information on previous physical performance level is often lacking.

Existing screening tools used at the time of admission focus primarily on adverse outcomes such as readmission and functional decline [9]. They have shown limited reliability [9] and are based entirely on self-reported information [10]. At a hospital level, self-reported information provides important information on previous functioning, but older adults often overestimate their own functional abilities [11, 12].

The 30-s Chair-Stand Test (30s–CST) and a cut-off point of 8 repetitions can predict the loss of functional mobility in older, community-dwelling adults [13]. Furthermore, physical performance measures have demonstrated predictive ability in acute, admitted older adults [14–21]. While a prediction model based solely on physical performance can lead to misclassification, since performance often improves from admission to discharge [17, 18], it remains true that most older adults with reduced physical performance at the time of admission continue to have poor performance at discharge [22].

This study aimed to identify predictors for persisting, reduced physical performance in older adults following acute hospitalisation.

The objectives were: 1) to describe changes in physical performance in older adults from admission until a minimum of 14 days after admission; 2) to identify potential predictors at admission for those older adults who have persistent reduced physical performance following hospitalisation; and 3) to develop a simple prediction model that will enable clinicians to identify at the time of admission those older adults who will continue to have reduced physical performance following acute hospitalisation.

Methods

Study design and participants

A prospective cohort study was conducted in a short-stay unit in a Danish emergency department (ED) from December 2014 to May 2015 [23]. In Denmark a short-stay unit provides targeted care for 48–72 h, followed by patient discharge or transfer to an in-patient unit. All participants were enrolled consecutively and assessed within the first 48 h of admission and again at a follow-up home visit that took place a minimum 14 days after the date of admission.

We recruited patients ages 65 years or older who were admitted to the short-stay unit, who resided in the hospital's catchment area, and who were admitted with a medical diagnosis (rather than a surgical or psychiatric diagnosis). Common medical diagnoses included infection, thromboembolic disease, musculoskeletal disease, and cardiovascular disease, but not patients with obvious signs of stroke or ST-elevation myocardial infarctions. Patients were enrolled in the study if they demonstrated reduced physical performance within the first 48 h of admission, specifically if they performed ≤8 repetitions in 30s–CST. We assumed that older adults who performed >8 repetitions in the 30s–CST were without significant risk of losing functional mobility, and hence the rationale for their exclusion from the study. Additional inclusion criteria included patient ability to sit on a chair independently within the first 48 h of admission, patient orientation to time and place, and patient ability to speak and understand Danish. Patients who could not walk at their baseline health were excluded.

Outcome measurement

The sole study outcome measurement was the 30s–CST. Older adults with a 30s–CST ≤ 8 were classified as having reduced physical performance, whereas those with a 30s–CST > 8 were considered to have non-reduced physical performance. The cut-off point was chosen based on evidence that community-dwelling older adults scoring ≤8 in the 30s–CST are at risk of losing functional mobility. This cut-off point was deemed to have acceptable validity and reliability [13, 24].

Potential predictors

The following self-reported information was collected in the process of evaluating potential predictors of persistent, reduced physical performance: age, gender, and mobility (climbing stairs and walking 400 m) [25]. Patients were asked if they had experienced difficulties with activities of daily living (ADL) within the last 2 weeks before the admission [26], if they had experienced

falls, if they had participated in moderate physical activity (excluding ADLs) that was strenuous enough to increase work of breathing and pulse, how they perceived their health [27], and finally if they had used a walking aid before admission [28]. Additional potential predictors included the number of prescribed medications (taken from medical records) and physical performance as assessed by the 30s–CST and the De Morton Mobility Index (DEMMI) [29].

The 30s–CST assesses lower-body strength and has moderate inter-rater reliability for acute, admitted 'medical' patients. A floor effect at the time of admission makes the test only moderately feasible in an acute care setting, but on the other hand the simplicity of the test facilitates its use in a busy, short stay unit [15]. The 30s–CST was performed by counting the number of times in a 30 s interval that a patient can stand from a sitting position with their hands crossed against their chest [30]. A Minimum Importance Change (MIC) on 2.9–2.6 stands has been determined for the 30s–CST [31].

DEMMI assesses mobility and balance through 15 hierarchical items and provides a score between 0 and 100 [29]. DEMMI is a valid and reliable measurement of these parameters for both hospitalised and community-dwelling older adults [14, 32–34]. A Minimal Detectable Change MDC_{90} of 9.0 and a Minimal Clinically Important Difference (MCID) of 10.0 has been determined for DEMMI [32].

Information on living arrangement, education, acute diagnosis, destination after ED (home or another department), and contact with social services before hospitalisation was collected either as self-reported information or from medical records, and used as demographic factors. Cognitive performance was tested using the Orientation–Memory–Concentration Test (OMC) [35].

Procedure

On weekday mornings, a physiotherapist recruited and tested patients for eligibility. Included patients provided written consent for study enrolment. In the 30s–CST assessment, patients who were unable to stand with their hands crossed against their chest scored 0. Patients who completed the task in a practice test, but were unable to stand in the actual test scored 1. To avoid fatigue after the 30s–CST test, we collected self-reported information before testing patients with the DEMMI. The DEMMI protocol was followed, except for the 'sit to stand no arms' (DEMMI item 6), as this had been demonstrated in the 30s–CST. After data collection, there was no further contact between the patient and the physiotherapist. The health staff had no access to study data and treatment was unaffected by study participation.

To inoculate post-discharge physical performance assessments from bias, a second physiotherapist, who did not perform the initial assessment, was selected to perform the follow-up assessment. If the patient was unable to participate at the originally scheduled post-hospital assessment then a later visit was scheduled soon thereafter. At the follow-up assessment, the 30s–CST and DEMMI were conducted with a ten-minute break between tests.

Statistical methodology

The sample size was calculated on the following assumption: for a multivariate analysis of potential predictors $n = 50 + 8\times$, where x is the number of independent variables [36]. Since we anticipated a 20% drop-out rate, a total of 156 patients were required as a precondition to including 10 potential predictors.

Potential predictors were classified into the following five domains: 1) demographic: age and gender; 2) self-reported mobility: walking 400 m, climbing a flight of stairs, walking aid use before admission, and falls; 3) self-reported habitual physical status: physical activity, self-rated health, and difficulties with ADLS in the 2 weeks before admission; 4) polypharmacy: number of prescribed medications; and 5) presenting physical performance: the 30s–CST and the DEMMI at the time of admission.

For the univariate logistic regression analysis, all continuous variables were dichotomised, with the exception of age, which was classified into 5 levels given the known association between age and physical performance. Cut-off points for continuous variables were based on Receiver Operating Characteristics (ROC) for the study data and on a literature review. In the literature we found a relationship between the ability to rise a maximum of five times and the risk of sarcopenia [37] and polypharmacy, as defined by ≥10 drugs associated with physical performance [38]. We found no recommended cut-off points for DEMMI. However, for semi-independent community-dwelling seniors, a score of 76.5 (95% CI 73.1–79.9) had previously been reported [39]. The ROC analysis revealed cut-off points at 30s–CST = 5, polypharmacy = 16 and DEMMI = 57 (see Additional file 1). We used the cut-off points found in the literature, except for DEMMI, for which the ROC cut-off 57 was used on account of the fact that acutely hospitalised older patients have lower physical performance than community-dwelling older adults [40]. Factors on ordinal scales were dichotomised (without difficulty or with difficulty/not at all).

For the multivariate analysis, age and gender were preselected [13, 17, 39–42]. The smallest numbers of events determined the permitted number of predictors [43]. Potential predictors were included in the multivariate analysis using the following data reduction: 1) potential predictors with a p value ≤0.20 in the univariate analysis were considered [44]; 2) if the predictors within a domain had a moderate (>0.50) correlation, the potential predictor with the highest odds ratio was selected; 3) the

final selection of predictors was based on the odds ratios and the assumed ease of use in an ED setting.

The potential predictors were tested for interaction. The area under the curve (AUC) was used to identify the final model and the model was tested with Hosmer–Lemeshow and for internal validity by bootstrapping [45].

Beta coefficients were employed to calculate the total score. The prediction model's performance was assessed by calculating the sensitivity/specificity and predictive values for older adults with continuous reduced physical performance upon follow-up. Moreover, we identified the number needed to treat/test (NNT).

Analyses were performed using STATA 14 (Stata Statistical Software, College Station, TX) in adherence with principles outlined in the guidelines for Strengthening the Reporting of Observational Studies in Epidemiology [46] and Transparent Reporting of a Multivariable Prediction Model for Individual Prognosis or Diagnosis [47].

The Regional Scientific Ethical Committees of Southern Denmark approved this study with a waiver (20.08.2014). As required by Danish legislation, written informed consent was obtained from participants to permit collection of information from medical records. The project was registered with the Danish Data Protection Agency (2008–58-0035) and in the ClinicalTrials.gov Identifier: NCT02474277 (12.10.2014).

Results

Overall, 820 older adults were admitted to the ED during the recruitment period and 156 patients were included in the study. A flowchart of inclusion, reasons for exclusion, and loss to follow-up appears in Fig. 1.

The follow-up occurred median 34 days (IQR 27–40 days) after admission. A total of 39 (25%) of the enrolled patients dropped out of the study prior to their follow-up assessment, leaving 117 patients for further analysis.

An analysis of patients who were lost to follow up compared to those who completed the study did not reveal significant differences in the examined variables, with the exception that 25 of the 39 (64%) patients who were lost to follow up did not walk independently at baseline compared with 50 of the 117 (43%) patients who completed the study ($p = 0.02$).

The basic characteristics of the enrolled patients are provided in Table 1, as are their admission characteristics in accordance with a 30s–CST ≤ 8 or >8 at the follow-up visit.

Overall, the median age was 77 years (IQR 71–85 years) and 68 (58%) were females.

Patients who demonstrated reduced physical performance at the time of follow-up were older (78 years; IQR 72–86) than those patients who had non-reduced physical performance (75 years; IQR 70–80). Approximately one third of patients enrolled in the study did not receive home health care from the municipality.

As a group, the mean length of stay (LOS) was 4.3 (SD 3.8) days. Patients discharged from the short stay unit had a mean LOS of 1.9 (SD 1.8), whereas patients transferred to a different ward had a mean LOS of 6.2 (SD 4.0) days. Further comparison between patients discharged from the short stay unit and patients transferred to a different ward showed that the former cohort had better performance testing at admission than the latter. For patients discharged or transferred to other wards the median 30s–CST scores were 2 (IQR 0–6) and 0 (IQR 0–3), respectively. At follow-up 63% of the patients discharged from the short stay unit had a 30s–CST ≤ 8 and 67% of patients transferred to other wards had a 30s–CST ≤ 8.

Changes in physical performance

Altogether, 78 (67%) of the patients improved their 30s–CSTs from admission to follow-up, 35 (30%) had an unchanged 30s–CST, and 4 (3%) had a lower 30s–CST. Although most patients improved from admission to follow-up, 76 (65%) of patients demonstrated persisting reduced physical performance (30s–CST ≤ 8).

More than half of patients had a 30s–CST improvement of 5 (IQR 3–7.3). The improvement was substantial for a sub-set of 13 patients (19%): their 30s–CST was 0 at admission and 11 at follow-up (IQR 10–12).

For DEMMI, 88 (75%) of the patients demonstrated improvements, whereas 16 (14%) deteriorated. The median improvement was 18.5 points (IQR 10.3–32.5).

Potential prognostic factors associated with reduced physical performance

Univariate analysis revealed 10 potential predictors with a p value ≤0.20; these were selected for further analysis (Table 2). The correlation was >0.50 or in other words of moderate strength, within the study domains of self-reported physical performance and presenting physical performance (see Additional file 2). This left six potential predictor variables for further model development, namely climbing stairs, physical activity, self-rated health, walking aid use, polypharmacy, and the 30s–CST, in addition to the preselected variables of age and gender.

The final selection of predictors, based on the odds ratio and the anticipated applicability and feasibility of use in the ED setting, narrowed down potential predictors to walking aid use before hospitalisation (OR: 7.1) and the 30s–CST ≤ 5 (OR: 9.1).

No significant interactions were found between potential predictors and the outcome measurement. The AUC for the full model was 0.80 (95% CI: 0.72; 0.89). The multivariate analyses showed that walking aid use before hospitalisation had an OR of 4.4 and that a 30s–CST ≤ 5 had an OR of 5.8 (Table 2).

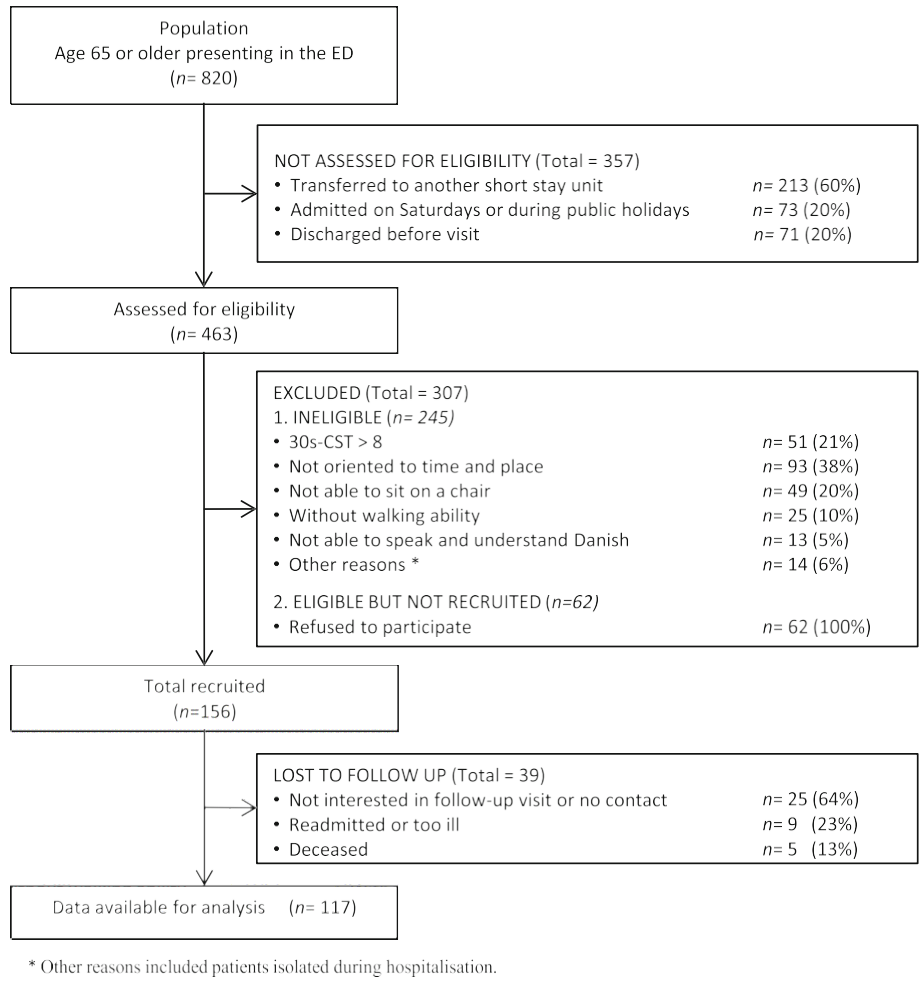

Fig. 1 Flow chart of inclusion process

A simple prediction model

Table 3 presents the selected predictors and their beta coefficients. In this sample, a score > 1.8 upon admission was able to identify 78% of patients who continued to have a reduced physical performance 1 month after acute hospitalisation. Furthermore, using a score of >1.8 only 2.43 patients were needed to identify one patient with reduced physical performance at follow-up (number needed to test).

Discussion

In this study, the majority of acutely admitted older adults identified with a 30s–CST score ≤ 8 at admission improved their physical status by the time of study follow-up. However, almost two thirds continued to have reduced physical performance (30s–CST ≤ 8). Several self-reported information and physical performance variables were associated with persistently reduced physical performance. On admission, a prediction model based on age, gender, walking aid use (indoor or outdoor) before hospitalisation, and a 30s–CST ≤ 5 allowed the authors to identify 78% of the older adults who continued to have reduced physical performance 1 month after admission.

Changes in physical performance

Our finding, that a majority of patients improved their physical performance from the time of admission to 1 month after admission, corroborates the findings from earlier studies that used the Short Physical Performance Battery (SPPB) and walking speed [17, 18, 22]. In our study 65% of patients showed reduced physical performance 1 month after admission, reinforcing the need to provide this group with targeted interventions, since frailty is associated with a loss of independence, increased community costs, and readmission [13, 18, 48].

Potential prognostic factors associated with reduced physical performance

The univariate logistic regression revealed ten potential predictors for reduced physical performance (p value ≤0.20).

Table 1 Cohort characteristics at the time of admission

				Admission characteristics by outcome status at follow-up			
		All participants (n = 117)		30s–CST >8 (n = 41)		30s–CST ≤8 (n = 76)	
Self-reported information		n	%	N	%	n	%
Living arrangement	Alone	66	56	22	54	44	58
	Cohabition	50	43	19	46	31	41
	Nursing home	1	1			1	1
Education	No vocational education	49	42	17	41	32	42
	Vocational or short-term training	53	45	13	32	40	53
	Medium/long/other education	15	13	11	27	4	5
Physical performance measures		median	IQR	median	IQR	median	IQR
30s–CST[a]		0	(0–5)	5	(0–7)	0	(0–2)
DEMMI[b]		44	(33–62)	62	(39–67)	41	(27–53)
Cognitive level		median	IQR	median	IQR	median	IQR
OMC[c] (n = 104)		24	(20–26)	24	(22–28)	23	(18–26)
Basic Mobility		n	%	N	%	n	%
Unable to rise with hands crossed against the chest		48	41	28	68	20	26
Unable to walk independently		50	42	12	29	38	50
Able to walk with walking aid		32	27	8	20	24	32
Able to walk without walking aid		35	30	21	21	14	18
Extracted information		n	%	N	%	n	%
Discharged from ED to home		51	44	19	46	32	42
Discharged from another department		66	56	22	54	44	58
Presenting complaints[d]	respiratory disorder	20	23	7	23	13	23
All participants (n = 87)	fever	16	18	7	23	9	16
30s–CST > 8 (n = 31)	nonspecific illness	13	15	4	13	9	16
30s–CST ≤ 8 (n = 56)	emergency track	12	14	5	16	7	13
	diarrhoea and/or vomiting due to infection	5	6	2	6	3	5
	extremity pain	3	4			3	5
	pain or disease in urinary tract	3	4	2	6	1	2
	dizziness	3	4			3	5
	chest pain	2	2			2	4
	head pain	2	2	2	6		
	others, including falls	8	9	2	6	6	11

[a] 30-s Chair-Stand Test, [b] De Morton Mobility Index (0–100), [c] Orientation-Memory-Concentration Test (0–28)
[d] Presenting complaints were extracted from a central database, these depend on doctor's report

Besides the preselected variables of age and gender, the event rate allowed two potential predictors to be included in the multivariate analysis. We selected use of walking aid before hospitalisation and a 30s–CST ≤ 5, as they had the highest odds ratio and were judged the most feasible tools to use in a busy ED setting. Moreover, using walking aids as a predictor makes clinical sense, since community-dwelling older adults use walking aids to improve balance and mobility [49]. On the other hand, walking aids are risk factors for low mobility [50] and their use before hospitalisation thus implies physical limitations and a higher risk of losing physical ability. Walking aids were also included in Hoogerduijn et al.'s model for assessing the risk of functional decline in acutely hospitalised older adults [51]. The other predictors in that study were a preadmission need for assistance in instrumental activities of daily living, a need for assistance in travelling, and a lack of education after age 14 [51].

A simple prediction model

We found that gender, age, self-reported information on walking aid use, and a 30s–CST ≤ 5, correctly identified

Table 2 Potential predictors for reduced physical performance (30s–CST ≤ 8) at follow-up (n = 117)

					Univariate analysis			Multivariate analysis			Bootstrapping	
Potential predictors	30s–CST > 8 (n = 41)	%	30s–CST ≤ 8 (n = 76)	%	Odds Ratio	95% CI	p-value	Odds Ratio	95% CI	p-value	95% CI	p-value
Domain: Demographic												
Age (years)												
65–70	10	24	13	17	1							
71–75	10	24	18	24	1.4	0.4–4.3	0.57					
76–80	8	20	11	14	1.1	0.3–3.6	0.93					
81–85	8	20	13	17	1.3	0.4–4.2	0.72					
> 85	5	12	21	28	3.2	0.9–11.7	0.07	1.1	0.3–4.2	0.88	0.3–4.8	0.89
Gender												
Male	21	51	28	37	1							
Female	20	49	48	63	1.8	0.8–3.9	0.14	1.8	0.7–4.5	0.20	0.7–4.9	0.25
Domain: Mobility												
Climbing a flight of stairs												
Without difficulty	29	71	25	33	1							
With difficulty/not at all	12	29	51	67	4.9	2.2–11.3	<.001					
Walking 400 m												
Without difficulty	27	66	31	41	1							
With difficulty/not at all	14	34	45	59	2.8	1.3–6.2	0.01					
Use of walking aid (in/outdoors)												
Not at all	31	76	23	30	1							
Sometimes/all the time	10	24	53	70	7.1	3.0–17.0	<.001	4.4	1.6–12.0	0.003	1.4–14.2	0.01
Falls												
No falls	28	68	57	75	1							
One or more falls	13	32	19	25	0.7	0.3–1.7	0.44					
Domain: Habitual physical status												
Participation in physical activity												
More than once a week	20	49	14	18	1							
Not at all	21	51	62	82	4.2	1.8–9.8	<.001					
Self-rated health (n = 116)												
Excellent/very good/good	33	82	43	57	1							
Less good/poor	7	18	33	43	3.6	1.4–9.2	0.01					
Difficulties in ADL												
not at all	18	44	29	38	1							
Some/most of the time	23	56	47	62	1.3	0.6–2.8	0.55					
Domain: Polypharmacy												
Polypharmacy												
< 10	28	68	39	51	1							
≥ 10	13	32	37	49	2.0	0.9–4.5	0.08					
Domain: Presenting physical performance												
30s–CST[a]												
Score > 5	18	44	6	8	1							
Score ≤ 5	23	56	70	92	9.1	3.2–25.9	<.001	5.8	1.9–17.8	0.002	1.5–21.9	0.01
DEMMI[b]												
Score > 57	21	51	12	16	1							
Score ≤ 57	20	49	64	84	5.6	2.3–13.4	<.001					

[a] 30-s Chair-Stand Test, [b] De Morton Mobility Index (0–100)
Hosmer-Lemeshow 0.19

patients who had continued reduced physical performance following acute hospitalisation. Moreover, a score > 1.8 identified 78% of patients with continuous reduced physical performance with a NTT of 2.43 patients. Clinically, all predictors need to be considered, since in isolation none of the model's variables have a score > 1.8. Our prediction model based on physical measures and self-reported information is the first of its kind. However, a study in primary care settings concerning community-dwelling older adults aged 65 or older has shown that for older adults with poor health the combination of physical performance measures and self-reported information is substantially better than either alone [52].

Existing screening tools to identify older adults who need a comprehensive geriatric assessment (CGA) have shown poor reliability in an acute setting [9]. Our prediction model supports the identification of older adults

Table 3 Prediction model to identify patients with persistent reduced physical performance after hospitalisation

Predictors	Beta coefficient			
Age > 85 years			0.1	
Female gender			0.6	
Use of walking aid (in−/outdoors)			1.5	
30s–CST ≤ 5			1.8	
Total score			4.0	
	Sensitivity (95% CI)	Specificity (95% CI)	Positive predictive value (95% CI)	Negative predictive value (95% CI)
Prediction model (cut-off >1.8)	82% (71–90)	59% (42–74)	78% (68–87)	63% (46–78)

who could benefit from a CGA, where a functional assessment is an integral part [53]. For patients discharged to other units than the geriatrics unit, the identification of older adults with persistent reduced physical performance might give rise to a targeted hospital intervention such as routine patient mobilisation. Furthermore, this study supports the evidence from other studies that self-reported information and physical performance measures provide different and complementary information [8]. From admission to follow-up, 19% of the patients had a 30s–CST change from 0 to 11. Hence, if the prediction model had been solely based on physical performance then 19% of patients would have been misclassified. For every 2–3 patients tested, clinicians will identify one patient with reduced physical performance 1 month after hospitalisation. However, since the negative predictive value is only 63%, every third with a negative test will still be at risk (Table 3). The prediction model does not comprehensively identify all at-risk patients, which the clinicians should be aware of. Clinically, this prediction model is easily applied: age and gender are known, determining walking aid use before hospitalisation requires one simple question, and the 30s–CST is easy to execute.

Strength and limitations

The study strength lies in its ability to assess physical performance using a simple objective measurement in combination with self-reported information. We used the 30s–CST in the prediction model while recognising that the floor effect could affect the baseline assessment. This choice was related to the well-known improvement in physical performance measures from admission to discharge [17, 18, 22].

Although up to 48 h was permitted from the time of admission to the time of baseline assessment, in practice the timeframe was much shorter as assessments were performed routinely every weekday morning. It follows that the prediction model was less influenced by the cause of hospitalisation.

The cohort included patients discharged from the short stay unit as well as patients transferred to other wards; thus a different risk for deterioration due to varied length of stay. However, the number of patients with reduced physical performance at follow-up in both groups (discharged from short stay unit or transferred to other wards) was comparable. This lack of difference in deterioration can be explained by the tiredness older adults generally experience after an acute admission [53].

The 30s–CST was used as an outcome measure even though the cut-off point of ≤8 for the 30s–CST is only validated for use in active, community-dwelling, older adults. We did so since the follow-up visit was performed in the older adult's home.

The binary stratification of the outcome measure might have resulted in a misclassification of some patients, due to the variation in patient performance [54]. We chose this dichotomisation since it is used in current literature [13, 24] and since it reflects recommendations made in Denmark and elsewhere for screening programs for community-dwelling, older adults.

We have described the predictor selection in detail, making the selection process easily reproducible in other settings. We managed to reach our pre-calculated sample size, but the study is weakened by a lower event rate than expected, which in turn restricted the number of predictors that were included in the model. Thus, before clinical implementation we recommend that the model's external validity is verified through larger studies using a different population. Moreover, the prediction model can only be generalised to older 'medical' patients who are mentally fit and show reduced physical performance upon admission.

Patients who were not assessed for eligibility can be seen as introducing a selection bias. However, 55% of patients were excluded based on organisational limitations, such as the day of admission, since patients were only recruited on weekdays. Of note, patients admitted on Sundays were included if they fell within the 48-h limit for enrolment. Patients who refused to participate generally offered two reasons; either they felt the project was irrelevant to them or they did not have the energy to participate.

The follow-up visits were completed at a median of 34 days (IQR 27–40) after admission, although the initial intention was to perform follow-up 14 days after admission. Delays in the follow-up assessment were due to patient preference, patient schedules, and the fact that some patients had not been discharged at the time of planned follow-up. We assume that the delay in follow-up was beneficial for this particular study, since it can be assumed that physical performance would have stabilised over a longer interval of time.

Conclusion

To minimize the risk for functional decline due to inactivity, it is important to identify older 'medical' patients with reduced physical performance at the time of admission. This might give rise to targeted hospital interventions, such as routine patient mobilisation, that can be used to prevent physical decline.

The presented model is easy to use in a busy ED, and for every three patients tested, one older adult with continued reduced physical performance following hospitalisation is identified. The model takes into account information on age, gender, and walking aid use before hospitalisation, combined with 30s–CST results.

Additional files

Additional file 1: ROC analysis. Receiver Operation Characteristic (ROC) for cut-off points. (PDF 103 kb)

Additional file 2: Correlations within the domains. The correlation for climbing stairs, walking 400 m., use of walking aid, physically activity, self-rated health, and the 30s–CST. (PDF 103 kb)

Abbreviations

30s–CST: The 30-s Chair-Stand Test; ADL: Activities of daily living; AUC: The area under the curve; DEMMI: De Morton Mobility Index; ED: Emergency department; NNT: Number needed to treat; OMC: Orientation–Memory–Concentration Test; ROC: Receiver Operation Characteristics; SPPB: Short Physical Performance Battery

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Availability of data and materials

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

Authors' contributions

IHB, BN, TM, BSC, CBM: conceptualised the design and manuscript development. IHB: data acquisition. IHB, CBM: data analysis. All the authors participated in the critical scrutiny and revision of the manuscript, and approved the final version.

Ethics approval and consent to participate

The Regional Scientific Ethical Committees of Southern Denmark approved this study with a waiver (20.08.2014). Written informed consent was obtained from all participants for collection of information from the medical records, which is required according to Danish legislation. The project was registered with the Danish Data Protection Agency (2008–58-0035) and in the ClinicalTrials.gov Identifier: NCT02474277. (12.10.2014).

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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[1]Department of Physiotherapy, Lillebaelt Hospital, University of Southern Denmark, Kolding, Odense, Denmark. [2]Department of Regional Health Research, University of Southern Denmark, Odense, Denmark. [3]Department of Public Health, Aarhus University, Aarhus, Denmark. [4]DEFACTUM, Central Denmark Region, Aarhus, Denmark. [5]Department of Public Health, University of Southern Denmark, Odense, Denmark. [6]Spine Centre of Southern Denmark, Lillebaelt Hospital, University of Southern Denmark, Odense, Denmark. [7]Emergency Department, Hospital of Southern Jutland, University of Southern Denmark, Odense, Denmark.

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Paper III

The effect of systematic functional assessment and immediate rehabilitation on physical performance in acutely admitted older adults with reduced functional performance: A randomized clinical trial

The effect of systematic functional assessment and immediate rehabilitation on physical performance in acutely admitted older adults with reduced functional performance: A randomized clinical trial

Inge H. Bruun,[1] Thomas Maribo,[2] Birgitte Nørgaard,[3] Berit Schiøttz-Christensen,[4] Morten G.B. Jessen,[5] Christian B. Mogensen[6]

ABSTRACT

Aims

We hypothesized that a systematic functional assessment in a short stay unit at an emergency department and/or immediate rehabilitation will result in sustained or improved physical performance in comparison to a regimen in which neither of these interventions is offered.

Methods

A two-way factorial randomized clinical trial was completed in an emergency department and the primary sector. We enrolled 336 nonsurgical patients of 65 years or older, scoring eight or less in the 30-second chair stand test (30s-CST). The interventions were: 1) Usual assessment; 2) Usual rehabilitation; 3) A systematic functional assessment performed within 48 hours of admission, in order to identify those with loss of functional mobility, or at risk thereof; and 4) Immediate rehabilitation initiated as soon as possible after discharge. The primary outcome was the 30s-CST three weeks after admission. Secondary outcome measures were Barthel, EQ-5D-3L, and length of stay.

Results

An intention-to-treat analysis showed no significant difference on the 30s-CST score nor when analysed by groups or by intervention. The changes were approximately 1% when compared to the reference.

No significant differences were found in the secondary outcomes. A per-protocol analysis showed that 99% had received assessment as assigned; however, the extent of mobilization during hospitalization was not fully disclosed. Forty-eight percent of the patients received the post-discharge rehabilitation they were assigned to.

Conclusion

Systematic functional assessment and immediate rehabilitation led to no significant differences in physical performance. The study was weakened by the incomplete disclosure of mobilization during hospitalization and low adherence to protocol during the immediate rehabilitation.

Keywords: 30-second chair stand test; functional assessment; rehabilitation; older adults; acute admission

Introduction

Older adults make up a large part of the patients admitted to short stay units in Danish emergency departments (ED) [1]. Their hospitalization aims to provide medical care and to secure a successful return to habitual functioning levels. However, for the group as a whole, hospitalization presents a risk of functional decline, after even a few days of physical inactivity or bed rest—in particular for those with reduced physical reserve capacity [2,3,4,5,6,7].

The short stay unit's focus on providing short term care (48–72 hours) and on treating the presenting illness presents a challenge to the identification of older adults at risk of functional decline [8]. Physical issues, such as the need for mobilization and post discharge rehabilitation, may receive less attention [8,9]. The transfer of patients to other departments may pose a further risk of postponing mobilization.

Screening is important in identifying older adults at risk of adverse outcome [8,10]; however, the existing screening tools have demonstrated poor predictive ability [11,12]. Although functional status at time of admission is a risk factor for adverse outcomes [13,14,15,16], acute settings conventionally rely on self-reported information on activities of daily living (ADL) [8,17,18], despite the fact that physical performance measures have demonstrated their usefulness as predictors of functional loss [19,20]. Moreover, a combination of self-reported and physical performance measures has been shown to provide even stronger indication than either alone [19,21,22].

We believe that a systematic functional assessment of older medical patients with reduced physical performance at admission is capable of identifying those with a loss of functional mobility, or at risk thereof. It further provides information on physical and functional issues, and forms the basis of recommendations on mobilization and assessments of the need for post-discharge rehabilitation. Such measures are expected to sustain the older adult's physical performance.

The need for coordination and cooperation with local care providers on follow-up and care in the home has been exacerbated by the trend toward establishing short stay units [23]. While discharge planning and follow-up care in the home are vital for older adults, several studies have demonstrated that they have a negligible impact on physical performance [24,25,26,27]. Hospitals' referrals to post-discharge rehabilitation may take several days to take effect [28,29]. This poses a problem, as acute admissions are often followed by tiredness, and thus low physical activity, in older adults [30,31].

Post-discharge rehabilitation initiated immediately after discharge is expected to support older adults' physical activity and thus maintain their function**.** The combined effect of systematic functional assessment and immediate rehabilitation is expected to affect older adults' physical performance more than either would on its own. The effect of this combination has not previously been studied.

Our study aimed to examine the effects of a systematic functional assessment combined with immediate rehabilitation of physical performance in older adults with reduced physical performance in an ED short stay unit.
We hypothesized that a systematic functional assessment in a short stay unit and/or immediate rehabilitation would result in sustained or improved physical performance, in comparison to a regimen in which neither of these interventions is offered.

Materials and methods

Design

A two-way factorial randomized clinical trial with equal distribution was conducted in a short stay unit in a Danish ED. Patients were recruited from April 2015 to August 2016; follow-up data were collected in the patients' homes from May 2015 to October 2016.
A study protocol was published prior to the study [32]. While alterations have been made in the exclusion criteria and secondary outcomes after the release, the most important change was the adjustment in sample size before the beginning of recruitment. This adjustment was made to integrate the results of a prospective cohort pilot study of 78 older adults who were acutely admitted to the short stay unit.
The reporting complies with the Consolidation Standards of Reporting Trials (CONSORT) [33] and the Templates for Intervention Description and Replication (TIDieR) [34]. The study was approved by the Regional Scientific Ethical Committees of Southern Denmark (Project ID: S-20130168) and registered with the Danish Data Protection Agency (2008-58-0035) and ClinicalTrials.gov. Identifier: NCT02062541 (02/12/2014).

Setting

All enrolled patients were referred to a short stay unit at a medium-sized regional hospital. Common complaints in the short stay unit include infection, thromboembolic disease, musculoskeletal disease, and cardiovascular disease, but not obvious signs of stroke or ST-elevation myocardial infarction. After immediate treatment and care in the short stay unit, patients are either discharged or transferred to other departments. The three municipalities making up the hospital catchment area have a mixed urban and rural population.
In Denmark, the responsibility for rehabilitation is shared by the hospital (secondary sector) and the municipality (primary sector). The municipalities are in charge before and after admission, while the hospital is responsible for rehabilitation during hospitalization. When post-discharge rehabilitation is needed, the hospital sends a referral for evaluation to the municipality. All rehabilitation services are free of charge, irrespective of the patient's income or insurance.

Participants

Patients of 65 years of age or older residing in one of the three municipalities who presented with nonsurgical diagnoses during weekdays were tested for eligibility. The inclusion criteria were ability to perform eight or fewer repetitions in the 30-second Chair Stand test (30s-CST) [35], which is considered a validated cut-off point for identifying community-dwelling older adults at risk of loss of functional mobility [36]; patient orientation to time and place; ability to speak and understand Danish; and, in order to avoid enrolling patients too ill for mobilization, ability to sit on an ordinary chair within the first 48 hours of admission. Patients with terminal illness, inability to walk at baseline, or prohibited from physical activity for medical reasons were excluded.

Outcome measures

The primary outcome measure was a 30s-CST score three weeks after admission. By counting the number of stands completed in 30 seconds with hands crossed against the chest, this test provides a valid measure of physical performance and a proxy measure for lower body strength [35], which is associated with the ability to perform ADL [37,38,39]. The 30s-CST has demonstrated good inter-rater reliability in acutely admitted older adults [40].

The Barthel index provides a valid and reliable measure of ADL performance for geriatric patients. The activities assessed are feeding, transfers, grooming, toilet use, bathing, mobility, stair climbing, dressing, bowels, and bladder [41].

The EQ-5D-3L is a standardized, nondisease-specific instrument which measures the health-related quality of life on five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression [42].

Data on length of stay (LOS) were obtained from the hospital patient administration system.

Adherence to protocol for the systematic functional assessment was checked against the total score of the de Morton Mobility Index (DEMMI) [43]. This was possible because the index was not ordinarily used in the short stay unit.

Adherence to the protocol for immediate rehabilitation was tested by checking the date of the first rehabilitation visit by municipal staff.

Baseline data included, besides demographic information (on age, gender, living arrangement, and education), the use of gait aids, self-rated health, number of drugs, the destination following the short stay unit (discharge or transferal), presenting complaints, the Orientation–Memory–Concentration test (OMC) [44], the body mass index (BMI), whether the patient received services at home before hospital admission, and whether he or she was participating in primary sector rehabilitation at time of admission.

Trial procedures

Patients were recruited and enrolled by one of the two project physiotherapists within the first 48 hours of admission. All patients gave their written consent to participate. Baseline data were then collected by a project physiotherapist, who also initiated the systematic functional assessment and immediate rehabilitation.

For the 30s-CST, inter-rater reliability between the two project physiotherapists was tested in a pilot study of 21 randomly selected patients admitted to the short stay unit; the calculated intraclass correlation (ICC) for acceptable reliability was 0.98 (95% CI: 0.96;0.99).

Randomization was performed by opening sequentially numbered opaque envelopes. A secretary with no patient contact undertook this job. The envelopes had been prepared in advance using a balanced internet based randomization list using 4, 8, and 12 blocks, stratified for each municipality [45].

Blinding of the physiotherapist performing the systematic functional assessment, or of the patients, was not possible. Regarding immediate rehabilitation, the primary sector staff who received information on the randomization were asked to conceal it. To ensure that the follow-up data were unaffected by previous measurements, the assistants responsible for collecting follow-up data had no access to patient information collected at baseline and were asked not to elicit it from the participants. In the analysis, the randomized groups were concealed until intention-to-treat and per-protocol analyses had been completed.

Follow-up data were collected no sooner than three weeks after admission by a group of assistants (nursing assistants, physiotherapists, and occupational therapists). Delays were unavoidable in cases where the patient was still admitted or ill at the time, but data were collected at the hospital or as soon as possible after discharge. For patients lost to follow-up, one of the following was recorded: Deceased, Not interested in visiting, Too ill to visit, or No contact possible.

To ensure consistent data collection despite changes in staffing, all assistants were instructed by a project physiotherapist; furthermore, in order to standardize data collection, the assistants and the project physiotherapist all met twice during the data collection period.

Intervention

Patients were randomized into one of four groups: (1) usual assessment and usual rehabilitation (*Group I*)*;* (2) usual assessment and immediate rehabilitation (*Group II*); (3) systematic functional assessment and usual rehabilitation (*Group III*); and (4) systematic functional assessment and immediate rehabilitation (*Group IV*) (Figure 1). The four interventions are briefly described below; further information is provided in the Appendix.

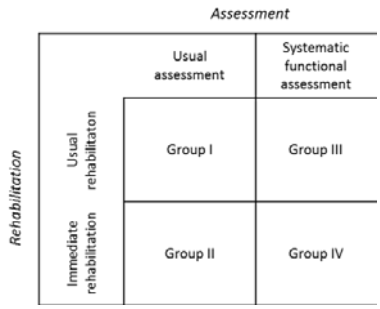

Figure 1. The four groups to which patients were randomized

Usual assessment *(Groups I and II):* Nurses and physicians carried out the usual assessment. If prescribed, physical therapy was administered by a physiotherapist with no knowledge of the systematic functional assessment. If a need for rehabilitation was identified, a referral to post-discharge rehabilitation was drafted by the physician or nurse.

Usual rehabilitation (*Groups I and III*): The usual procedure was followed-up on referral to post-discharge rehabilitation.

Systematic functional assessment (*Groups III and IV*): The assessment was performed within 48 hours of admission by one of several trained physiotherapists.

Aging, inactivity, and rehabilitation needs were key elements of the assessment. With a view to identifying older adults with a loss of functional mobility, or at risk thereof, information was retrieved from medical records, interviews, and a DEMMI based evaluation of physical performance, which assesses mobility and balance across the spectrum from bed-bound to independently mobile [43,46].

If needed, the systematic functional assessment was followed by services carried out by the same physiotherapist. When relevant, a referral for post-discharge rehabilitation was sent to the patient's home municipality. This was followed by the usual procedure regarding treatment, communication, etc.

Immediate rehabilitation (*Groups II and IV*): Beyond an agreement with the municipalities that immediate rehabilitation, preferably within five days of discharge, would be initiated, ordinary rehabilitation procedures were followed.

Power calculation

The power calculation was based on a pilot cohort study with 30 days follow-up after admission. We found a 30s-CST mean change of 3.9 repetitions and a standard deviation (SD) of 4. We aimed at a change higher than the Minimal Detectable Change (MDC_{90}), which is defined as two sit to stands in the 30s-CST [47]. The power calculation indicated that, to achieve β and α significance levels of 0.8 and 0.05, respectively, 64 patients would be required in each of the four groups. The vulnerability of this group was expected to result in a 30% dropout rate, thus requiring a total of 336 patients, with 84 patients in each group.

Statistical methods

Baseline data for the intervention group and the control group were compared to assess the homogeneity of the randomized groups. Fisher's exact test was used for categorical variables. One-way analysis of variance (ANOVA) was used for normally distributed continuous variables; the Kruskal–Wallis test was employed for non-normally distributed data.

The analyses were conducted following the intention-to-treat principle. The 30s-CST and LOS were analyzed using a negative binominal regression model; a linear regression model was used for the Barthel and EQ-5D-30. The baseline measurement was applied as a covariate; the analyses were furthermore performed both with and without age and gender as covariates. Data were missing on one item in the Barthel sum score; an imputation by standardization was therefore performed based on the remaining nine items.

Due to the 2 × 2 design, a test for interaction was performed, and since no significant interactions were found, the four groups were collapsed into two: Assessment and Rehabilitation.

Based on poor adherence to the protocol for immediate rehabilitation, a secondary per-protocol analysis was performed. This was followed by ancillary analyses: a descriptive analysis and an analysis of association between the 30s-CST and LOS. All analysis was performed using STATA 15 [48].

Results

Overall, 2981 patients were admitted to the ED during the recruitment period; 1585 were assessed for eligibility within 48 hours of admission (a flowchart of inclusion appears in Figure 2). The two largest groups of patients who failed to meet the inclusion criteria were those with a 30s-CST > 8 (35%) and those lacking orientation in time and place (30%). The main reasons offered by patients for refusal to participate (25%) were: feeling tired, already had too many visits (home care, etc.), or that the study had no relevance to them. This left 336 patients for randomization, which was reduced to 334 when two patients withdrew their consent. An analysis of patients assessed for eligibility compared to the non-assessed patients showed no significant differences in age or gender. An examination of patients assessed at follow-up and patients not assessed at follow-up (n = 62) showed no significant differences in baseline data, physical performance measures, or LOS.

The follow-up was conducted a median of 23 (IQR 21–29) days after admission. There were no significant differences in time from admission to follow-up between the groups (I–IV).

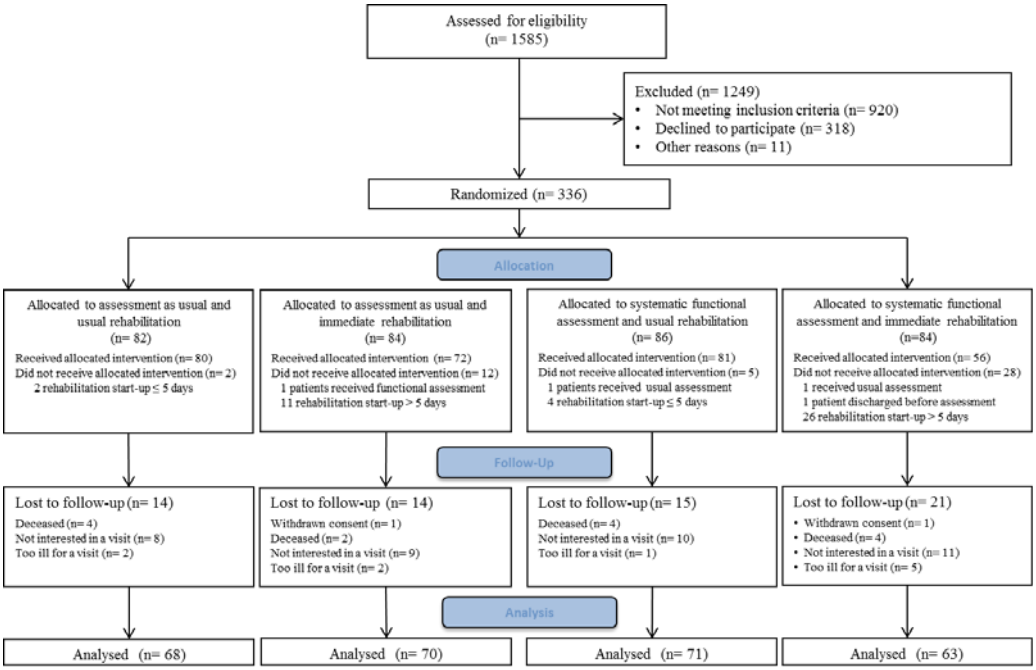

Figure 2. Flowchart of inclusion process

The baseline data for the included patients are shown in Table 1. A total of 147 (54%) patients had received services at home within the last six months before hospitalization. When tested for comparability, the differences between for all four groups were found acceptable for all variables (p-value > 0.05).

Table 1: Baseline characteristics at admission

			Patients received allocated intervention	Admission characteristics by randomized group			
				Group I*	Group II*	Group III*	Group IV*
			(n= 272)	(n= 68)	(n= 70)	(n= 71)	(n= 63)
Age (years)		median (IQR[1])	78 (72–85)	78 (71–84)	77 (72–84)	76 (73–84)	80 (72–86)
Gender: female		n (%)	167 (61%)	39 (57%)	39 (56%)	43 (61%)	46 (73%)
Living arrangement	Alone	n (%)	150 (55%)	39 (57%)	38 (54%)	41 (58%)	32 (51%)
	Cohabiting		119 (44%)	29 (43%)	31 (45%)	29 (41%)	30 (48%)
	Nursing home		3 (1%)	0 (0%)	1 (1%)	1 (1%)	1 (2%)
Education	No vocational education	n (%)	84 (31%)	22 (32%)	18 (26%)	22 (31%)	22 (35%)
	Vocational/short-term training		132 (49%)	36 (53%)	34 (48%)	31 (44%)	31 (49%)
	Medium/long/other		56 (20%)	10 (15%)	18 (26%)	18 (25%)	10 (16%)
Gait aids: indoor	Yes	n (%)	96 (35%)	24 (35%)	26 (37%)	23 (32%)	23 (37%)
Gait aids: outdoor	Yes	n (%)	145 (53%)	40 (59%)	34 (49%)	35 (49%)	36 (57%)
	Not going out		14 (5%)	4 (6%)	3 (4%)	4 (6%)	3 (5%)
Self-rated health	Less good/bad	n (%)	104 (38%)	33 (49%)	27 (39%)	25 (35%)	19 (30%)
	Good		115 (42%)	21(31%)	29 (41%)	32 (45%)	33 (52%)
	Excellent/very good		53 (20%)	14 (20%)	14 (20%)	14 (20%)	11 (18%)
Number of drugs		median (IQR)	10 (7–13)	10 (7–14)	10 (6–13)	9 (7–13)	10 (7–13)
Length of stay		mean (SD[2])	4.7 (4.5)	4.6 (3.9)	5.1 (4.8)	4.6 (4.9)	4.3 (4.3)
Discharged from ED to home		n (%)	105 (39%)	24 (35%)	22 (31%)	31 (44%)	28 (44%)
Transferred from ED to another department		n (%)	167 (61%)	44 (65%)	48 (69%)	40 (56%)	35 (56%)
Participation in rehabilitation at admission		n (%)	32 (12%)	12 (18%)	8 (11%)	5 (7%)	7 (11%)
Presenting complaints[3]		n (%)	(n= 225)	(n= 56)	(n= 58)	(n= 60)	(n= 51)
	Respiratory disorder		61 (27%)	13 (22%)	12 (21%)	19 (31%)	17 (33%)
	Nonspecific illness		44 (20%)	9 (16%)	15 (25%)	12 (20%)	8 (15%)
	Fever		36 (16%)	9 (16%)	12 (21%)	7 (11%)	8 (15%)
	Emergency track		11 (5%)	4 (7%)	0 (0%)	4 (7%)	3 (6%)
	Chest pain		11 (5%)	4 (7%)	3 (5%)	1 (2%)	3 (6%)
	Impaired or lose consciousness		15 (7%)	2 (4%)	4 (7%)	4 (7%)	5 (11%)
	Abdominal pain		9 (4%)	2 (4%)	4 (7%)	3 (5%)	0 (0%)
	Others		38 (16%)	13 (24%)	8 (14%)	10 (17%)	7 (14%)
			(n= 250)	(n= 60)	(n= 64)	(n= 69)	(n= 57)
OMC[4]		median (IQR)	22 (20–26)	22 (20–24)	24 (20–26)	23 (19–26)	22 (18–26)
			(n= 137)	(n= 35)	(n= 32)	(n= 36)	(n= 34)
BMI[5]		median (IQR)	26 (23–29)	27 (21–31)	27 (23–33)	25 (23–28)	26 (23–29)
			(n= 272)	(n= 68)	(n= 70)	(n= 71)	(n= 63)
30s-CST[6]		median (IQR)	3 (0–6)	3 (0–6)	3 (0–5)	4 (0–7)	3 (0–6)
EQ-5D-3L		median (IQR)	0.7 (0.6–0.8)	0.7 (0.5–0.8)	0.7 (0.6–0.8)	0.7 (0.6–0.8)	0.7 (0.6–0.8)
			(n= 268)	(n= 67)	(n= 68)	(n= 71)	(n= 62)
Barthel[7]		median (IQR)	18 (16–20)	17 (15–19)	18 (16–20)	18 (16–20)	18 (16–19)

*Group I: Assessment as usual and usual rehabilitation; II: Assessment as usual and immediate rehabilitation; III: Systematic functional assessment and usual rehabilitation; IV: Systematic functional assessment and immediate rehabilitation

[1]Interquartile range (IQR) [2]Standard Deviation (SD) [3]Acute diagnoses were extracted from a central database (these depend on doctor's report)

[4]Orientation-Memory-Concentration test (0–28) [5] Body Mass Index (BMI) [6]30-second chair stand test (30s-CST) [7]Barthel (0–20)

Primary outcome

Although all four randomization groups improved their physical performance from baseline to follow-up, as measured by the 30s-CST; the analysis showed no significant differences in physical performance between the four randomization groups a median of 23 days after admission (Table 2). No significant differences were identified by including age and gender covariates: the incidence rates were between 0.92 and 1.0. A test of interaction revealed no statistically significant differences; for this reason, patients assigned to the usual assessment were compared to patients assigned to the systematic functional assessment; similarly for the usual rehabilitation and immediate rehabilitation. Still, no significant difference in 30s-CST scores was found (Table 2). Whether the analysis was performed by group or by intervention, with or without age and gender as covariates, the changes remained at 1% when compared to the reference.

Table 2: Primary outcome by group and intervention

30s-CST[1], by group

At baseline mean (SD[2])	At follow-up mean (SD)	Intention to treat	IRR[3]	95% CI[4]	*p*-value
3.1 (3.2)	6.2 (4.9)	Assessment as usual and usual rehabilitation (group I) (n= 68)		Reference	
3.0 (3.0)	5.8 (4.2)	Assessment as usual and immediate rehabilitation (group II) (n= 70)	0.99	0.7;1.3	0.93
3.5 (3.4)	6.4 (4.9)	Systematic functional assessment and usual rehabilitation (group III) (n= 71)	1.0	0.8;1.3	0.99
3.2 (3.1)	6.1 (3.9)	Systematic functional assessment and immediate rehabilitation (group IV) (n= 63)	0.99	0.7;13	0.95
		Interaction assessment and rehabilitation			1.0
30s-CST, by intervention					
		Intention to treat			
3.0 (3.1)	6.0 (4.5)	Usual assessment (n= 138)		Reference	
3.3 (3.2)	6.3 (4.4)	Systematic functional assessment (n= 134)	1.0	0.8;1.2	0.98
3.3 (3.3)	6.3 (4.9)	Usual rehabilitation (n= 139)		Reference	
3.1 (3.0)	5.9 (4.0)	Immediate rehabilitation (n= 133)	1.0	0.8;1.2	0.91

[1]30-second chair stand test (30s-CST) [2]Standard deviation (SD) [3]Incidence rate ratio (IRR) [4]Confidence interval(CI)

Secondary outcomes

As shown in Table 3, neither Barthel, EQ-5D-3L, nor LOS showed any significant differences between the four randomization groups or when analyzed by intervention. These results were obtained regardless of whether age and gender were included as covariates. For each prediction variable, a trivial beta coefficient or incidence rate ratio was found, as well as an identical improvement per group from baseline to follow-up.

Table 3: Secondary outcomes by randomized group

Barthel (standardized)

At baseline median (IQR[1])	At follow-up median (IQR)	Intention-to-treat	Coef.	95% CI[2]	*p*-value
17 (15–19)	18 (17–20)	Assessment as usual and usual rehabilitation (group I) (n= 68)		Reference	
18 (16–20)	19 (16–20)	Assessment as usual and immediate rehabilitation (group II) (n= 70)	0.09	-0.7; 0.8	0.81
18 (16–20)	19 (18–20)	Systematic functional assessment and usual rehabilitation (group III) (n= 71)	0.37	-0.4; 1.1	0.32
18 (16–19)	19 (17–20)	Systematic functional assessment and immediate rehabilitation (group IV) (n= 63)	0.37	-0.3; 1.0	0.28

EQ-5D-3L

0.7 (0.5–0.8)	0.7 (0.5–0.8)	Assessment as usual and usual rehabilitation (group I) (n= 68)		Reference	
0.7 (0.6–0.8)	0.7 (0.5–0.8)	Assessment as usual and immediate rehabilitation (group II) (n= 70)	0.01	-0.07; 0.08	0.90
0.7 (0.6–0.8)	0.7 (0.5–0.8)	Systematic functional assessment and usual rehabilitation (group III) (n= 71)	0.04	-0.03; 0.1	0.27
0.7 (0.6–0.8)	0.7 (0.4–0.8)	Systematic functional assessment and immediate rehabilitation (group IV) (n= 63)	-0.02	-0.1; 0.1	0.58

Length of stay

mean (SD[3])		IRR[4]	95% CI	*p*-value
4.6 (3.9)	Assessment as usual and usual rehabilitation (group I) (n= 68)		Reference	
5.2 (4.8)	Assessment as usual and immediate rehabilitation (group II) (n= 70)	1.1	0.8;1.4	0.48
4.6 (4.9)	Systematic functional assessment and usual rehabilitation (group III) (n= 71)	1.0	0.8;1.3	0.91
4.3 (4.3)	Systematic functional assessment and immediate rehabilitation (group IV) (n= 63)	0.93	0.7;1.2	0.59

[1] Interquartile range (IQR) [2] Confidence interval (CI) [3] Standard deviation (SD) [4]Incidence rate ratio (IRR)

Adherence to protocol and per-protocol analysis

DEMMI based scrutiny of the implementation of the systematic functional assessment in the short stay unit demonstrated adherence to protocol, given that 269 (99%) were treated according to the protocol for their assigned group. No data were collected on the degree of mobilization in the short stay unit or any subsequent department.

The hospital sent 82 referrals to the municipalities, 37 (45%) of which concerned patients randomized to the usual rehabilitation and 45 (55%) concerned patients randomized to immediate rehabilitation. Scrutiny of the municipal response to patients allocated to immediate rehabilitation demonstrated that only 39 (48%) of the patients had received the post-discharge rehabilitation they were assigned to. Immediate rehabilitation was defined as rehabilitation initiated within five days after

receipt of the referral. The average delay from the receipt of referral to initiation of post-discharge rehabilitation was 12 days (SD 7.1). The corresponding figure for immediate rehabilitation was 11 days (SD 7.6), with 13 days for usual rehabilitation (SD 6.3).
A per-protocol analysis demonstrated no significant differences between the four groups; the same result was obtained when comparing the rehabilitation and the assessment interventions. Analysis of secondary outcomes (Barthel and EQ-5D-3L) demonstrated no significant differences.

Ancillary analyses
A comparison of the usual assessment against systematic functional assessment identified no significant differences regarding baseline data and follow-up data, except for the number of referrals (Table 4).
An examination of the data on referred patients showed that 31 (38%) had had no contact with the primary sector within the last six months; of those, 15 (48%) were discharged from the short stay unit.
The 30s-CST score at time of admission was demonstrated to be significantly associated with LOS; the decrease in the incident rate of LOS was approximately 1% for every extra repetition of the 30s-CST, holding age and gender constant.
Moreover, as Table 4 demonstrates, patients discharged from the short stay unit and patients transferred to another department showed significant differences in 30s-CST scores at time of hospital admission. Similar results were found at follow-up.

Table 4: Ancillary analyses

			Referrals (n=82)*[1]		Discharged home or transferred (n=272)*[1]	
			Usual assessment (n=26)	Systematic functional assessment (n=56)	Discharged home from the short stay unit (n=105)	Transferred to other units (n=167)
Age years		median (IQR[1])	81 (73–86)	79 (73–86)	77 (71–84)	80 (72–85)
Living arrangement	Alone	n (%)	15 (58%)	31 (55%)	57 (54%)	93 (56%)
	Cohabitation		11 (42%)	24 (43%)	47 (45%)	72 (43%)
	Nursing home			1 (2%)	1 (1%)	2 (1%)
Education	No education	n (%)	12 (46%)	20 (36%)	32 (30%)	52 (32%)
	Vocational/short training		9 (35%)	30 (54%)	48 (46%)	84 (50%)
	Medium/long/Other		5 (19%)	6 (11%)	25 (24%)	31 (19%)
Gait aids: indoor	Yes	n (%)	11 (42%)	21 (38%)	34 (32%)	62 (37%)
Gait aids: outdoor	Yes	n (%)	18 (69%)	35 (63%)	59 (56%)	100 (60%)
Self-rated health	Less good/bad	n (%)	14 (54%)	24 (43%)	42 (40%)	62 (37%)
	Good		8 (31%)	23 (41%)	43 (41%)	72 (43%)
	Excellent / very good		4 (15%)	9 (16%)	20 (19%)	33 (20%)
Number of drugs		median (IQR)	10 (6–13)	10 (7–13)	10 (7–13)	9 (7–13)
Length of stay		mean (SD[2])	7.6 (5.4)	5.2 (4.5)	1.5 (1.1)	6.7 (4.7)*[2]
No home service within		n (%)	10 (38%)	21 (38%)	44 (42%)	80 (48%)
Participants in rehabilitation at		n (%)	0	0	14 (13%)	18 (11%)
30s-CST[3]	at admission	median (IQR)	0 (0–3)	0 (0–5)	5 (0–7)	0 (0–6)*[2]
	at follow-up		4 (0–7)	5 (0–8)	7 (3–10)	6 (0–9)*[3]
EQ-5D-3L	at admission	median (IQR)	0.6 (0.5–0.7)	0.7 (0.6–0.7)	0.7 (0.6–0.8)	0.7 (0.5–0.8)
	at follow-up		0.6 (0.5–0.7)	0.7 (0.6–0.8)	0.7 (0.5–0.8)	0.7 (0.5–0.8)
Referrals in the short stay unit		n (%)	4 (15%)	41 (73%)*[2]		
Referrals outside the short stay unit		n (%)	22 (85%)	15 (27%)*[2]		
Referrals		n (%)			22 (21%)	23 (14%)*[2]
			(n=21)	(n=51)	(n=98)	(n=152)
OMC[4]		median (IQR)	22 (19–26)	22 (18–24)	24 (20–26)	22 (18–24)*[2]
			(n=26)	(n=55)	(n=104)	(n=164)
Barthel	at admission	median (IQR)	16 (12–18)	17 (15–19)	18 (16–20)	18 (16–19)*[4]
			(n=26)	(n=56)	(n=105)	(n=167)
	at follow-up		18 (14–19)	18 (17–20)	19 (17–20)	19 (17–20)

[1]Interquartile range (IQR) [2]Standard deviation (SD) [3]30-second chair stand test (30s-CST) [4]Orientation-Memory-Concentration test (0–28) *[1]P-values are only specified if there is a significant difference. *[2]p<0.00 *[3]p=0.03 *[4]p=0.04

Discussion

This study was based on the assumption that older patients would benefit from the introduction of systematic functional assessment within 48 hours, either alone or in combination with immediate rehabilitation. The 2 x 2 study design enabled us to test all four combinations offered when the new procedures were tried in combination with the usual procedures. However, when the older adults with reduced physical performance (30s-CST ≤ 8) were followed up 23 days after admission, we were unable to detect any significant improvement in physical performance as a result of the new interventions.

This was true both when systematic functional assessment was compared with usual assessment, and when immediate rehabilitation was compared with usual rehabilitation.
Ours is the first study to examine the combined effect in acutely admitted older adults of early systematic functional assessment and immediate rehabilitation, with the latter based on a transition model in which the responsibility for rehabilitation is passed to the primary sector at the time of discharge.

Systematic functional assessment
We had assumed that systematic functional assessment would at least sustain physical performance in older adults with reduced physical performance at hospital admission. We likewise expected that we would be able to identify patients with reduced physical performance in order to stimulate early mobilization and make recommendations on mobility.
A previous study of 15–20 minute mobility training sessions with elderly geriatric hospital patients demonstrated a significant difference in follow-up mobility after one month [49]. The intervention was assisted mobility training and walking twice a day, combined with a behavioral intervention strategy to encourage the patients to spend more time out of bed [49]. Besides the encouragement, the major difference from our study was that responsibility for the intervention was delegated to one person, whereas our study involved the entire nursing staff of the busy short stay unit. Furthermore, since no data on mobility were collected, the degree of improvement in mobilization during the hospital stay was not transparent.
A previous study on multidisciplinary collaboration has indicated that, despite the best intentions among staff, in a ward with heavy workloads and no clear assignment of responsibility, recommendations result in poor implementation [50]. Such factors may have weakened the effect of our attempts at early assessment and mobilization. With regard to the transferred patients, the health professionals in the receiving departments were optimistic that the existence of a systematic functional assessment would have a beneficial effect, since its recommendations would stimulate speedier continuation after the relocation [9]. However, our study may have been weakened by the fact that the staff was not effectively alerted to the existence of the assessment and that continuity in mobilization was unknown, since no data were collected on mobility level.
In summary, our intention was to assess the effect of a systematic functional assessment, followed by mobilization, on older adults' physical performance; however, the examined construct turned out to concern organizational issues rather than the patients' physical performance.
The study has demonstrated that it is possible to implement a systematic functional assessment within the first 48 hours. Ancillary analysis has furthermore shown that a systematic functional assessment can identify a significantly higher number of

patients in need of referral to post-discharge rehabilitation than the usual assessment. The nonsignificant differences in results between the usual regimen and the systematic function assessment found for other baseline variables lead us to believe that the rise in referrals is based on the real need for rehabilitation, rather than on increased attention.

The relevance of a systematic functional assessment is corroborated by the fact that almost half of the older adults who were referred to rehabilitation upon discharge from the short stay unit to home had received no home services before admission. It can thus be assumed that their needs were unknown to the municipality.

Fifty percent of the older adults who were discharged from the short stay unit or transferred to another ward achieved a 30s-CST score ≤ 8 at follow-up, which indicates a loss of functional mobility, or a risk of such loss. Furthermore, 25% of the older adults transferred to another department were unable to stand up with hands crossed against the chest at follow-up, indicating a risk of requiring help with basic activities of daily living (BADL) [39,51]. These results indicate that inactivity during, but also after hospitalization, represents a risk of functional decline for many acutely admitted older adults.

Despite the clear and unambiguous inclusion and exclusion criteria, the frailty of our target population prevented us from identifying and excluding those at the end of life; we thus noted a decease rate of 23% (14) after inclusion.

Immediate rehabilitation

Although this study was unable to demonstrate any effect of immediate rehabilitation on physical performance, it should be noted that the limited number of referrals (n = 82) provided insufficient power for identifying any existing difference. The power was moreover reduced by poor adherence to protocol. To summarize, our study cannot provide any evidence on the effect of immediate rehabilitation following hospitalization on older adults' physical performance. An interim analysis or procedural integrity check performed at an earlier stage may have revealed the lack of adherence.

Several factors may lie behind the difficulties with protocol adherence: 1) the older adults' frailty and lack of energy; 2) the force of work habits—the regulations stipulate that post-discharge rehabilitation be initiated within 14 days; 3) heavy workloads and a lack of financial resources in the municipalities; 4) different perspectives in the secondary and primary sectors [52]. To exemplify this, the hospital nurses prioritized conveying information on ADL, while the home healthcare nurses were more likely to seek information on medical problems and diagnosis [53]. Further research is needed to explore this.

The external validity of this study is challenged by the low power of the data on immediate rehabilitation. Furthermore, the incomplete information on mobilization levels prevents us from making clinical recommendations based on our work.

However, we do wish to offer some proposals for future studies: The different results for discharged patients, compared with the transferred patients, indicate strong variance within groups. When combined with the negligible between-group variance, the effect size is minimized; we therefore recommend that future clinical studies take the heterogeneity of the population into account. The small between-group variance may stem from the fact that the systematic functional assessment had several similarities with the usual assessment. The relevance of a systematic functional assessment of acutely admitted older adults remains; it should, however, be ensured that it is fully implemented and its impact thoroughly assessed. The effect of mobilization likewise needs to be assessed in a more targeted way, for instance by dedicating responsibility to a single person.

An Australian team demonstrated that initiating an individualized exercise program at the time of admission, combined with facilitation during the hospital stay and a follow-up visit within 48 hours by the hospital nurse, as well as follow-up telephone calls, led to improved functional ability and fewer emergency readmissions [54,55]. A more efficient procedure for immediate post-discharge rehabilitation may thus be achieved by ensuring that hospital health staff continues work on mobility until the municipality is ready to take over.

Despite the well-known floor effect of the 30s-CST [27,40], we recommend it for assessing the effect of mobilization and immediate rehabilitation. This is based on the fact that our work, in line with other studies, has demonstrated improvement in older adults' physical performances during hospitalization [20,56]. Another advantage of the 30s-CST is its ease of use, both in the short stay unit and in older adults' homes. The Barthel index, which is often used with medical patients, was selected despite its ceiling effect [40,57]. The majority of patients maintained their Barthel score at follow-up, thus making the instrument less ideal for older adults who are independent in BADL, as is the case with many older adults with a 30s-CST score ≤ 8. The high number of participants who declined participation because they felt burdened by multiple service visits may have led to an underrepresentation of those requiring help with BADL. Similarly, recruiting only on weekdays might have left out some of the frailest older adults, who are admitted during the weekend when their general practitioner is unavailable.

Our considered opinion is that, despite the nonsignificant results obtained in this study, an examination of the effects of mobilization during hospitalization and of immediate rehabilitation is of vital importance to helping older adults maintain an independent lifestyle—a health outcome of high priority for themselves and for society [58].

Strengths and limitations

We consider it a strength of this study that our population was recruited from three different municipalities and that the systematic functional assessment was performed

by several physiotherapists, as this minimizes the influence of individual behavior and values.

However, this study has several limitations. The inability to blind the patients and physiotherapists implied a risk of bias in performance and detection, although we believe we have minimized the risk by collecting the baseline data before randomization, and ensuring that the assistants who collected the follow-up data had no knowledge of the previous data.

Although our sample size was calculated on the basis of a two-group design, it was applied to a design with four groups. In any case, a calculation for four groups and a minimal difference of two sit to stands would have required 324 patients, allowing for a 30% dropout—less than the 336 enrolled in our study. Nevertheless, sample sizes should be calculated based on the number of referrals, since this number is crucial in achieving sufficient power for the identification of possible differences in the immediate rehabilitation results if they exist.

A test of inter-rater reliability between the project physiotherapists using the Barthel index was not performed, nor was this done between the project physiotherapist and the project assistants, nor among the project assistants. Such tests should ideally have been performed.

Conclusion

In order to support acutely admitted older adults in maintaining physical performance, it is essential to identify those in need of physical activity during and after a hospital stay. In comparison with a regimen in which neither a systematic functional assessment nor immediate rehabilitation is offered in an ED short stay unit, we hypothesized that such interventions would lead to sustained or improved physical performance. However, we found no significant difference in physical performance, as measured by the 30s-CST or the Barthel.

Conflict of interest

There were no conflicts of interest.

Authors' contributions

Inge Hansen Bruun
Group 1: Conception and design, acquisition of data, analysis and interpretation of data; Group 2: Drafting the article, critical revision of the article; Group 3: Final approval of the version to be published
Thomas Maribo
Group 1: Conception and design; Group 2: Critical revision of the article; Group 3: Final approval of the version to be published
Birgitte Nørgaard
Group 1: Conception and design; Group 2: Critical revision of the article; Group 3: Final approval of the version to be published
Berit Schiøttz-Christensen
Group 1: Conception and design; Group 2: Critical revision of the article; Group 3: Final approval of the version to be published
Morten G.B. Jessen
Group 1: Acquisition of data; Group 2: Critical revision of the article; Group 3: Final approval of the version to be published
Christian B. Mogensen
Group 1: Conception and design, analysis and interpretation of data; Group 2: Critical revision of the article; Group 3: Final approval of the version to be published

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AUTHORS

Bruun, Inge H,[1] MR
Maribo, Thomas,[2] PhD
Nørgaard, Birgitte,[3] PhD
Schiøttz-Christensen, Berit,[4] PhD
Jessen, Morten G.B,[5] PT
Mogensen, Christian B,[6] PhD

AFFILIATIONS:

[1] PhD student, Department of Physiotherapy and Occupational Therapy, Lillebaelt Hospital, Kolding, Denmark
[1] Institute of Regional Health Research, University of Southern Denmark, Odense, Denmark. Email; Inge.Hansen.Bruun@rsyd.dk
[2] Associate Professor, Department of Public Health, Aarhus University, Aarhus, Denmark
[2] DEFACTUM, Central Denmark Region, Aarhus, Denmark.
Email; thomas.maribo@rm.dk
[3] Associate Professor, Department of Public Health, University of Southern Denmark, Odense, Denmark
Email; binorgaard@health.sdu.dk
[4] Professor, MD, Spine Centre of Southern Denmark, Lillebaelt Hospital, Middelfart, Denmark
[4] Institute of Regional Health Research, University of Southern Denmark, Odense, Denmark
Email; Berit.Schiottz-Christensen@rsyd.dk
[5] Physiotherapist, Department of Physiotherapy and Occupational Therapy, Lillebaelt Hospital, Kolding, Denmark

Email; Morten@herfra.dk
[6] Associate Professor, MD, Emergency Department, Hospital of Southern Jutland, Aabenraa, Denmark
[6] Institute of Regional Health Research, University of Southern Denmark, Odense, Denmark
Email: Christian.Backer.Mogensen@rsyd.dk

Appendix

Usual assessment *(Groups I and II):* The usual assessments were performed by nurses and physicians, according to their preferences and skills. The assessments were usually based on self-reported information on the need for help with activities of daily living (ADL)[17]. The need for rehabilitation was typically determined by diagnosis or need for help with ADL, as identified by physicians or nurses in the short stay unit. Activities aiming at maintaining physical performance seemed to have less focus [8].

Usual rehabilitation (*Groups I and III*)*:* The usual procedure was followed; this involved assessing the patient's rehabilitation needs. The assignment was then passed on to a different physiotherapist or occupational therapist, who was also responsible for drawing up an individual rehabilitation plan that would take into account the older adult's preferences and other contextual factors, such as other rehabilitation services being offered. Post-discharge rehabilitation must be initiated within 14 days of the primary sector staff's receipt of the referral.

Systematic functional assessment *(Groups III and IV):* The systematic functional assessment was designed in collaboration between the first author and experienced physiotherapists from the short stay unit and the geriatric unit. Recent literature on older adults, along with the knowledge obtained in our study of the short stay unit, were likewise integrated into the work [9]. The theoretical concept underlying the development process was the International Classification of Functioning, Disability, and Health (ICF) [59], a biopsychosocial framework focusing on the impact of the patient's health condition, in which disability is consistently seen as a result of the interactions between functioning and contextual factors [60]. In the systematic functional assessment, we focused on body functions and activities, thus giving priority to study, inactivity, and rehabilitation needs. It is vital that all ICF components are included in the assessment when planning discharge and post-discharge rehabilitation.
Within the first 48 hours of admission, the systematic functional assessment was performed by one of the nine project physiotherapists, all of whom were familiar with the ICF framework. Both sexes were represented in the group; three of the physiotherapists had more than ten years of experience, two had between five and

ten years, while five had qualified less than five years previously. A checklist was developed to ensure consistency in assessment throughout the study period. The systematic functional assessment was based on information obtained from medical records and self-reports of mobility and ADL. Combining this with the De Morton Mobility Index (DEMMI) scores obtained at admission, we were able to base the assessment on information on morbidity, comorbidity, number of admissions within the last six months, falls, balance–walking problems, use of walking aids, habitual mobility, and need for ADL help; as well as changes in mobility and ADL capability within the last six months, participation in and motivation for training. If needed, gait aids were provided for early mobilization, since the DEMMI includes items on getting out of bed, moving from sitting to standing position, and walking a distance of 50 meters. The information on mobility and balance provided a secure basis for the mobility during hospitalization. Compared to physical exercises, less strenuous mobilization appears to be more relevant in a short stay unit, as patients are often tired and unavailable due to medical examinations [61].

Immediate rehabilitation (*Groups II and IV*): The intervention was developed in cooperation with municipal rehabilitation centers, represented by the heads of the department and the therapists involved in post-discharge rehabilitation. A steering group with representation from all parties was appointed to monitor the conduct of the study.

The physiotherapist or occupational therapist in charge of rehabilitation was tasked with drawing up individual rehabilitation plans that took the older adult's preferences and contextual factors into account. They also coordinated with other rehabilitation services being offered.

The municipalities' ordinary procedures were followed in this study, except for an agreement that immediate rehabilitation was initiated as soon as possible, preferably within five days.

Paper IV

The effect on physical performance of a functional assessment and immediate rehabilitation of acutely admitted older adults with reduced functional performance: the design of a randomized clinical trial

BMJ Open

The effect on physical performance of a functional assessment and immediate rehabilitation of acutely admitted elderly patients with reduced functional performance: the design of a randomised clinical trial

Inge Hansen Bruun,[1] Birgitte Nørgaard,[2] Thomas Maribo,[3,4,5] Berit Schiøttz-Christensen,[6,7] Christian Backer Mogensen[8,9]

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For numbered affiliations see end of article.

Correspondence to
Inge Hansen Bruun;
Inge.Hansen.Bruun@rsyd.dk

ABSTRACT

Introduction: Illness and hospitalisation, even of short duration, pose separate risks for permanently reduced functional performance in elderly medical patients. Functional assessment in the acute pathway will ensure early detection of declining performance and form the basis for mobilisation during hospitalisation and subsequent rehabilitation. For optimal results rehabilitation should begin immediately after discharge.The aim of this study is to investigate the effect of a systematic functional assessment in the emergency department (ED) of elderly medical patients with reduced functional performance when combined with immediate postdischarge rehabilitation.

Method and analysis: The study is a two-way factorial randomised clinical trial. Participants will be recruited among patients admitted to the ED who are above 65 years of age with reduced functional performance. Patients will be randomly assigned to one of four groups: (1) functional assessment and immediate rehabilitation; (2) functional assessment and rehabilitation as usual; (3) assessment as usual and immediate rehabilitation; (4) assessment and rehabilitation as usual.

Primary outcome: 30 s chair-stand test administered at admission and 3 weeks after discharge.

Ethics and dissemination: The study has been approved by the Regional Scientific Ethical Committees of Southern Denmark in February 2014. The study findings will be published in peer-reviewed journals and presented at national and international conferences.

Trial registration number: ClinicalTrials.gov Identifier: NCT02062541.

INTRODUCTION

In Denmark, as in other countries, recent decades have seen changes in the organisation of emergency departments (ED) aiming at increasing the quality of the acute patient pathway.[1] Admissions to the ED are intended to be of short duration, often less than 18 h; 70–80% of the patients are discharged to community-based care and rehabilitation.[2 3]

A majority of ED patients are older than 65 years of age and have a medical concern.[4] Illness and hospitalisation involves a risk of permanently reduced functional performance,[5–7] after even a few days' physical inactivity or bed rest.[8–13]

The organisational changes in the EDs have led to the introduction of physiotherapist services. By assessing the patients' functional performance, it is possible to support early detection of decline in performance and provide a baseline description for mobilisation efforts during hospitalisation and subsequent rehabilitation after discharge. This application to the acute patient pathway is supported by findings from other studies that have found physiotherapy services to improve and support mobility, providing gait aids, assisting with patient mobility and transfers, chest physiotherapy and discharge planning.[14–20] Physiotherapy services have furthermore been shown to contribute to increased well-being and self-reliance among patients.[14–18 21] However, existing studies of physiotherapy in the acute patient pathway have mainly surveyed or audited the work of physiotherapists, whereas the effect on the functional performance of the patient is less documented.[14 16–18 21 22]

Furthermore, continuous rehabilitation after the hospital discharge is important in order to minimise the risk of inactivity, as elderly patients cannot be expected to

initiate physical exercise activities.[23] In this perspective the challenge is that transfer between healthcare sectors involves a risk of the rehabilitation process being interrupted, because patients discharged from hospital may have to wait for weeks before the municipal rehabilitation is initiated.[24]

In general, the importance of functional assessment is well established[25] but its effect in the acute patient pathway on the functional performance, when combined with immediate rehabilitation after discharge, has not previously been studied.

Aims and hypotheses

The aim of this study is to investigate the effect of a systematic functional assessment in the ED of elderly medical patients with reduced functional performance when combined with immediate postdischarge rehabilitation. We hypothesise that a functional assessment in the ED or/and immediate rehabilitation will result in sustained or improved performance in comparison to a regimen in which neither of these interventions are offered.

METHODS AND ANALYSIS

Study design

The study is designed as a two-way factorial randomised single-blinded clinical trial, in accordance with the SPIRIT 2013 Statement (Standard Protocol Items: Recommendations for Interventional Trials).[26] We will investigate the effect of functional assessment and/or immediate rehabilitation as outlined in figure 1. The study involves a regional hospital and two municipal rehabilitation centres. The trial takes place from 1 February 2015 to 30 June 2016.

A steering group has been appointed to monitor the conduct of the study. The group consists of the participating researchers who are all affiliated to or employed at the University of Southern Denmark or Aarhus University, Denmark. The municipal rehabilitation centres are represented by two heads of department and two heads of section.

Setting

EDs in Denmark consist of an out patient area including the emergency room and an admission area. Patients will be recruited from the admission area. Patients discharged from the ED and patients transferred to other clinical departments are included in the study. Functional performance will be assessed at admission and 3 weeks later during a scheduled visit at home or in the hospital if the patient has not been discharged.

Responsibility for rehabilitation programmes is shared by the hospital and the municipality. The hospital is in charge of rehabilitation during hospitalisation but if further rehabilitation is needed at discharge a referral correspondence is sent to the municipal rehabilitation centre. Services in hospitals and at municipal rehabilitation centres are free of charge in Denmark. The two participating municipalities have a mixed urban and rural population.

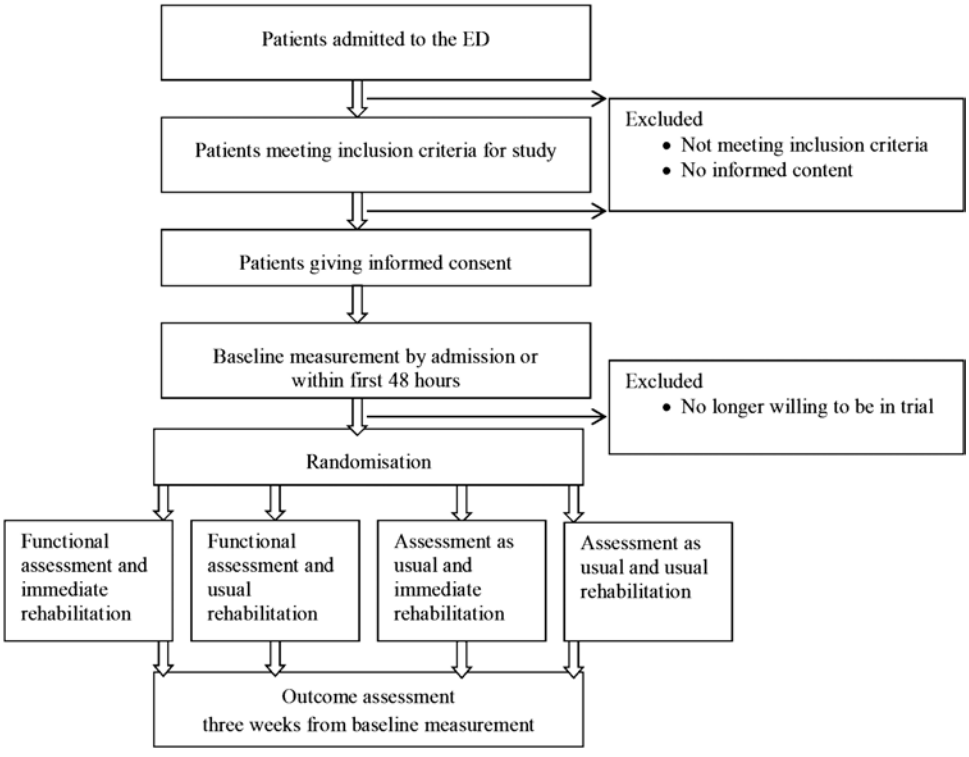

Figure 1 The study process (ED, emergency department).

Study sample

Study population

The study will include patients of 65 years of age or older acutely admitted to the ED with a medical concern who meets the following criteria.

Inclusion criteria

- Can speak and understand Danish.
- Resident in either of the two included municipalities.
- Can report personal data and decide on consent.
- Within the first 48 h of admission are able to sit on an ordinary chair but perform ≤9 repetitions at the 30 s chair-stand test.[27]

Exclusion criteria

- Patients suffering from a progressive neurological or cognitive deficit or disease.
- Patients ordinarily unable to walk.

Patients who are excluded, or eligible patients declining participation, will be registered in either of three categories: Not meeting the inclusion criteria, No informed consent or No longer willing to be in trial, in accordance with the SPIRIT 2013 Statement.[26]

Procedure for recruitment and randomisation

All patients hospitalised on weekdays in the inclusion period will be assessed consecutively by one of two project assistants, who are also responsible for informing the patient about the project in writing and orally and for registering consent and collection of data. After informed consent is obtained and completion of the baseline test the patient is randomised to one of the four groups.

A stratified randomisation by municipality is used due to heterogeneity, furthermore due to sizes a two-to-one ratio. A balanced randomisation is achieved by using random permuted blocks of 8 and 12 for each of the stratified subsets.

A random number table is used for allocation to groups and sequentially numbered envelopes are prepared for concealment. A person who is not in contact with the patients in any other way is responsible for the preparation of an abundant number of opaque envelopes containing the randomisation result, and this person randomises the patient by opening the envelope. The result of the randomisation is communicated to the patient, the hospital physiotherapist and the rehabilitation centre officer in charge of distribution to rehabilitation.

Sample size

We aim at recruiting 528 patients (132 per group). The sample size calculation is based on Gill and McBurney's investigation of the reliability of the chair-stand test with knee and hip osteoarthritis patients (Mean 6.35, SD 3.35).[28]

It is assumed that functional assessment followed by immediate rehabilitation will improve the patient's ability to sustain functional performance after hospitalisation. The chosen sample size enables us to identify changes in the primary outcome of 20% between the groups. Power calculations indicated that 110 patients were required in each of the four groups (STATA V.12) to achieve β and α significance levels of 0.8 and 0.05, respectively. Owing to the vulnerability of this group of patients, a 20% drop-out rate is expected, thus requiring 528 patients with 132 in each group, as illustrated in figure 2.

Inclusion time: In the 12 months from 1 January to 31 December 2012, 625 patients admitted to the hospital's ED met the general study criteria (medical concern, age +65 years, resident in one of the two municipalities).[i] It is estimated that 60% of these would have fulfilled all inclusion criteria. With inclusion restricted to Mondays to Fridays, a recruitment period of 16 months is required, with 8–9 entries/week.

Blinding

The randomisation takes place after the baseline assessment and is concealed from the project assistants. Blinding of hospital physiotherapists, the rehabilitation centre officer in charge of distribution to rehabilitation and patients to the trial condition is not possible.

Study conditions

Patients will be randomised to one of four groups: (1) functional assessment and immediate rehabilitation; (2) functional assessment and usual rehabilitation; (3) usual assessment and immediate rehabilitation and (4) usual assessment and usual rehabilitation.

At the hospital

Functional assessment: a functional assessment is performed following an algorithm developed especially for this study. Based on the findings from this assessment the physiotherapist suggests a plan for mobilisation, rehabilitation or physical activity during hospitalisation, a plan which follows the patient in case of transferral to another department and will be communicated to the municipal rehabilitation centre when the patient is discharged.

Usual assessment will be carried out by nurses and physicians in the ED. Mobilisation and physical activity during hospitalisation is initiated by the nurses. If rehabilitation or physiotherapy is needed during hospitalisation the physiotherapy department is notified with information about the need for physical activity and the department will assist accordingly.

If rehabilitation is needed after discharge the hospital is required by legislation to send a referral letter to the municipality.

At the municipal rehabilitation centres

The municipal rehabilitation centres offers training and activity. Each patient gets his or her individual plan

[i]According to the patient administration system, 2013.

Figure 2 Patients by trial group (N).

		Municipality	
		Immediate rehabilitation	Usual rehabilitation
Hospital	Functional assessment by physiotherapist	132 patients	132 patients
	Usual assessment	132 patients	132 patients

aiming at the patient's previous level of functionality or the best possible performance.

Immediate rehabilitation is initiated within 5 days after discharge.

Usual rehabilitation is initiated as early as possible respecting the existing waiting time.

Study outcomes

Data as described in table 1 will be collected by project assistants, specifically trained for the assignment. Inter-rater reliability will be tested. A procedure will ensure that the collection of data at admission and 3 weeks later are not performed by the same projects assistant. If a patient is no longer available, the reason will be identified.

Primary outcome

The 30 s chair-stand test is a valid and reliable indicator of lower body muscle strength and functional capacity in older adults.[29 30] A Danish translation of the original English-language version will be used.[31]

Secondary outcomes

The Barthel Index provides a reasonably reliable and valid test of treatment efficacy for geriatric patients.[32–34] The calculation is based on the patients' responses. The instructor will have access to a Danish translation of the original English-language version.[35]

The Self-efficacy for Functional Activities (SEFA) questionnaire assesses an elderly person's confidence by assessing their responses to nine items. Tests have shown that SEFA is a reliable and valid tool when used with elderly citizens.[36]

Patient satisfaction: a questionnaire will be developed to assess the patient satisfaction. The questionnaire will be tested for face and content validity before use.

Length of stay: data are obtained from the hospital patient administration system.

Patient characteristics

Information will be collected on patient's age, gender, living arrangement, educational level, body mass index, multiple medication use (if any) and physical activity level.

Intervention implementation

The number of days from discharge to the start of rehabilitation is recorded for the trial. Data are obtained from the patient administration systems of the municipalities.

Data management

An automated forms processing system will be used for the transfer of data from paper to the electronic format. This method is a validated alternative to double entry of data.[37] Until scanning, paper records are stored in a locked unit. The resulting database will not be opened before analysis.

Data analysis

Descriptive analysis

Categorical data will be represented by numbers and proportions; continuous variables are shown by medians and quartiles. Baseline data will be compared with control for the comparability of randomised groups. The χ^2 test or Fisher's exact test are used for the analysis of categorical variables. For analysis of continuous variables, one-way analysis of variance (ANOVA) and Kruskal-Wallis tests are used for non-parametric and normally distributed variables, respectively.

Primary and secondary analysis

All analyses will be conducted based on the intention-to-treat principle. Missing outcomes will be imputed and for non-adherence to protocol, a per-protocol analysis will be conducted as sensitivity analysis.

A non-response analysis will be carried out for excluded patients and non-completers.

Data will be analysed according to the 2×2 randomised factorial study designs. The two-way ANOVA will be used for the chair-stand test, Barthel Index, SEFA and length of hospitalisation. A pair-wise comparison between groups will be conducted. STATA V.13 will be used for all statistical analyses.

Author affiliations
[1]Department of Physiotherapy, Kolding Hospital, a part of Hospital Lillebaelt, Kolding, Denmark
[2]Centre for Applied Health Services Research, Institute of Public Health, University of Southern Denmark, Odense, Denmark
[3]Department of Public Health, Aarhus University, Aarhus, Denmark
[4]MarselisborgCentret, Danish Rehabilitation Research Center, Aarhus, Denmark
[5]National Public Health and Quality Improvement, Central Denmark Region, Aarhus, Denmark
[6]Spine Centre of Southern Denmark, Middelfart Hospital, a part of Hospital Lillebaelt, Middelfart, Denmark
[7]Institute of Regional Health Research, University of Southern Denmark, Middelfart, Denmark
[8]Emergency Department, Aabenraa Hospital, Hospital of Southern Jutland, Aabenraa, Denmark
[9]Institute of Regional Health Research, University of Southern Denmark, Aabenraa, Denmark

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Provenance and peer review Not commissioned; peer reviewed for ethical and funding approval prior to submission.

Data sharing statement It is a study protocol, which has been approved by the Danish Data Protection Agency.

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9. Appendices

9.1. Appendix A: A literature study

A systematic search was conducted from the 26.06.2014 to 25.07.2014. The search strategy involves two substrategies, as functional assessment is not a MESH term

The first search strategy was to identify important articles followed by related articles or cited entries. It was performed in two parts of the Cochrane Library: Economic Evaluations Database and Health Technology Assessment Database.

The second strategy was a systematic search with a broad search profile structure in five phases in the following databases: PubMed, Cinahl, Embase, Cochrane and Pedro (+ Human).

The aim was to examine the effect of a systematic functional assessment, whereas focus was on randomized clinical trials (RCT) and the quality of identified studies was assessed using risk of bias (188). If the second strategy had entailed studies using other designs than the RCT design, the assessment would be conducted using appropriate tools. The broad search profile was structured by PICo: P = Patient; I = Interest; Co = Context. The search terms were refined according to the searched database. The following table shows the search terms used:

Patient					
	Pubmed Mesh/ Keyword	Embase Thesarus/ Keyword	Cinahl+/ Keyword	Cochrane Mesh/ Keyword	Pedro Mesh/ Keyword
Health Services for the aged	**Mesh**	-	-	**Mesh**	Gerontology
Aged	**Mesh**	**Heading**	**Heading**	Keyword	
Aged 80 and over	**Mesh**	-	**Heading**	**Mesh**	
Frail Elderly	**Mesh**	**Heading**	**Heading**	**Mesh**	
Elderly Care	Keyword	**Heading**	Keyword	Keyword	
Elderly	Keyword	(-)	Keyword	Keyword	
Elder	Keyword	Keyword	Keyword	Keyword	
Elders	Keyword	Keyword	Keyword	Keyword	
Old	Keyword	Keyword	Keyword	Keyword	
Older	Keyword	Keyword	Keyword	Keyword	
Geriatric	Keyword	(-)	Keyword	-	
Geriatrics	**Mesh**	**Heading**	**Heading**	**Mesh**	

Interest					
	Pubmed Mesh/ Keyword	Embase Thesarus/ Keyword	Cinahl+/ Keyword	Cochrane Mesh/ Keyword	Pedro Mesh/ Keyword
Functional ability	Keyword	Keyword	Keyword	Keyword	Functional ability
Functional abilities	Keyword	Keyword	Keyword	Keyword	
Functional assessment	Keyword	**Heading**	**Heading**	Keyword	Functional assessment
Functional assessments	Keyword	-	**-**	Keyword	
Functional status	Keyword	**Heading**	**Heading**	Keyword	Functional status
Functional outcome	Keyword	Keyword	Keyword	Keyword	
Functional outcomes	Keyword	-	Keyword	Keyword	
Functional decline	Keyword	Keyword	Keyword	Keyword	Functional decline
Functional capacity	Keyword	(-)	Keyword	Keyword	
Function recovery	Keyword	Keyword	Keyword	Keyword	
Functional performance	Keyword	Keyword	Keyword	Keyword	Functional performance

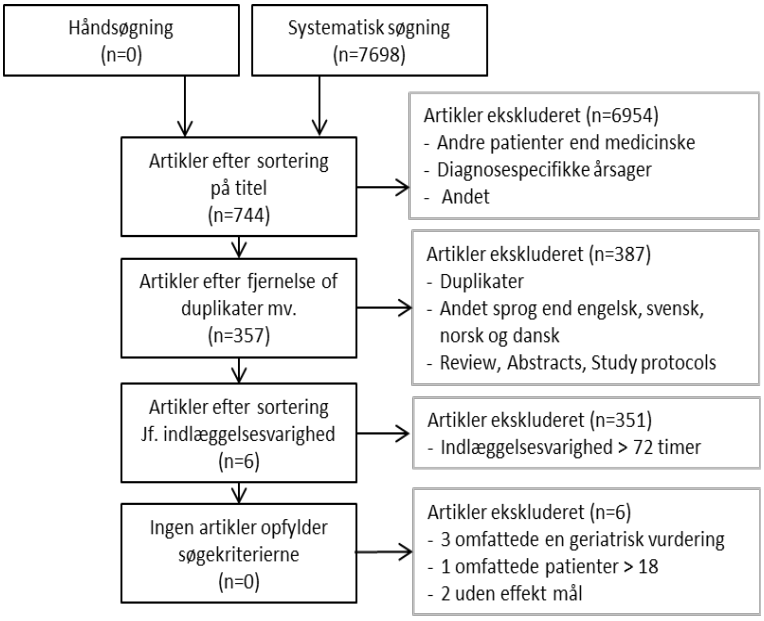
Geriatric assessment	**Mesh**	**Heading**	**Heading**	**Mesh**	Geriatric assessment
Activities of daily living	**Mesh**	**Daily life activity (heading)**	**Heading**	**Mesh**	Activities of daily living
Patient care team	**Mesh**	Keyword	Keyword	**Mesh**	
Multidisciplinary care team	Keyword	Keyword	**Heading**	Keyword	
Mobility status	Keyword	Keyword	Keyword	Keyword	Mobility status
Mobility Limitation	**Mesh**	**Walking difficulty (heading)**	Keyword	**Mesh**	Mobility Limitation
Physical status	Keyword	Keyword	Keyword	Keyword	Physical status
Physical performance	Keyword	**Heading**	Keyword	Keyword	Physical performance
Walking speed	**Mesh**	**Heading**	**Walking (heading)**	**Mesh**	
		Pubmed Mesh / Keyword			
Barthel index		Keyword			
Functional Independence Measure (FIM)		Keyword			
Kats index		Keyword			
Instrumental activities of daily living scale (IADL)		Keyword			
Timed up and go (TUG)		Keyword			
ADL-taxonomi		Keyword			
De Morton Mobility Index (DEMMI)		Keyword			
Short physical performance Battery (SPPB)		Keyword			
30-s Chair Stand test		Keyword			
Six-minute walk test (6MWT)		Keyword			

Context					
	Pubmed Mesh/ Keyword	Embase Thesarus/ Keyword	Cinahl +/ Keyword	Cochrane Mesh /Keyword	Pedro Mesh/ Keyword
Acute hospitalized	Keyword	Keyword	Keyword	Keyword	Acute hospitalized
Acutely hospitalized	Keyword	Keyword	Keyword	Keyword	Acutely hospitalized
Acute care	Keyword	(-)	**Heading**	Keyword	Acute care
Acutely ill hospitalized	Keyword	Keyword	Keyword	Keyword	
Emergency hospital service	**Mesh**	-	**Emergency Service**	**Mesh**	Emergency
Acute care setting	Keyword	Keyword	Keyword	Keyword	Acute care setting
Short stay unit	Keyword	Keyword	Keyword	Keyword	Short stay unit
Acute ward	Keyword	Keyword	Keyword	Keyword	Acute ward
Short term hospitalized	Keyword	Keyword	Keyword	Keyword	Short term hospitalized
Emergency care	Keyword	**Heading**	**Heading**	Keyword	Emergency care
Emergency ward	Keyword	**Heading**	Keyword	Keyword	Emergency ward
Adolescent, Hospitalized	**Mesh**	**Heading**	**Heading**	**Mesh**	Adolescent, Hospitalized

Identified papers were sorted based on the title. They needed to meet the following criteria: Elderly medical patients age 65+. Papers covering various medical diagnoses were included in the study; however, papers with an exclusive focus on a particular condition, e.g., Parkinson, stroke, etc., were excluded. In addition, articles covering CGA in its entirety were excluded, since this considers functional assessment and other aspects, such as medication. To ensure identification of articles solely focusing on functional assessment, CGA was included in the list.

Duplicates, reviews, study protocols, and papers in languages other than English, Swedish, Norwegian, and Danish were removed.

The next phase was reading of abstracts and papers to 1) identify studies on patients admitted for less than 72 hours and 2) functional assessment with the use of a performance measurement tool. The search and sorting was handled by the author.



9.2. Appendix B: Studies I–III: Data collected in SurveyXact (Danish)

Prospective cohort study, Studies I–II: Baseline data

CPR			
Indlæggelsesdato			
Opfyldelse af inklusionskriterier	(1) ❑ Ikke habil, taler ikke dansk, for dårlig mv		
Informere om projektet			
Patienten ønsker at deltage	(1) ❑ Ja	(2) ❑ Nej	
Gangfunktion	(1) ❑ Ja	(2) ❑ Nej	
Patienten kan sidde selvstændigt på en almindelig stol (ikke kørestol)	(1) ❑ Ja	(2) ❑ Nej	
Klarer du selv at komme omkring i hjemmet?	(1) ❑ Ja	(2) ❑ Nej	
Anvender du normalt et ganghjælpemiddel (stok, rollator), når du færdes indenfor?	(1) ❑ Hele tiden	(2) ❑ Noget af tiden	(3) ❑ På intet tidspunkt
Anvender du normalt et ganghjælpemiddel (stok, rollator), når du færdes udenfor?	(1) ❑ Hele tiden	(2) ❑ Noget af tiden	(3) ❑ På intet tidspunkt

Boform	(1) ❑Alene	(2) ❑Samboende	3) ❑ Plejehjem / aflastningshjem
Uddannelse	(1) ❑ Nej	(2) ❑ Et eller flere kortere kurser (specialarbejderkurser, arbejdsmarkedskurser m.v.)	(3) ❑ Erhvervsfaglig uddannelse /faglært (kontor-eller butiksassistent, frisør, murer, lægesekretær, social-og sundhedshjælper, landmand)
	(4) ❑ Kort videregående uddannelse, 2-3 år (markedsøkonom, politibetjent, laborant, maskintekniker, økonoma, tandplejer)	(5) ❑ Mellemlang videregående uddannelse 3-4 år (folkeskolelærer, socialrådgiver, sygeplejerske, fysioterapeut, pædagog)	(6) ❑ Lang videregående uddannelse mere end 4 år (civilingeniør, cand,mag, læge, psykolog)

(7) ❑ Anden uddannelse

Helbred
Hvordan synes du, dit helbred er alt i alt?

(1) ❑ Fremragende (2) ❑ Vældig godt (3) ❑ Godt

(4) ❑ Mindre godt (5) ❑ Dårligt (6) ❑ Ikke spurgt /for træt

Patientens fysiske aktivitetsniveau

Deltager ud udover daglige gøremål i moderat fysisk aktivitet (altså aktiviteter der er så anstrengende, at dit åndedræt og puls øges, og du kommer til at svede) (Gang er ok, hvis gangen er i et tempo/varighed der giver øget puls)

(1) ❑ Mere end tre gange om ugen (2) ❑ Mindre end tre gange om ugen (3) ❑ Slet ikke (4) ❑ Ikke spurgt / for træt

Mobilitet

Kan du normalt				
Gå 400 meter uden at hvile	❑ uden besvær	❑ med lidt besvær	❑ med meget besvær	❑slet ikke
Gå op eller ned ad en trappe fra en etage til en anden etage uden pause	❑ uden besvær	❑ med lidt besvær	❑ med meget besvær	❑slet ikke

Habituel funktionsevne	(1) Det klarer jeg uden hjælp	(2) Det klarer jeg med hjælp
Af- og påklædning	❑	❑
Toiletbesøg	❑	❑
Bruse- og /eller karbad	❑	❑
Madlavning	❑	❑
Rengøring	❑	❑
Indkøb af dagligvarer	❑	❑

30- sekunder rejse-sætte sig / Verbal instruktion til tester (i kursiv)
Vi skal finde ud af, hvor stærk du er i dine ben, ved at se, hvor mange gange du kan rejse dig fra en stol og sætte dig på 30 sekunder. Jeg viser dig lige, hvordan testen skal udføres.
Vis testen, først i langsomt tempo for at demonstrerer teknikken
Sæt dig midt på stolen (med ret ryg) og fødderne ved siden af hinanden. Håndleddene krydser du og lægger hænderne fladt på brystet. Det er vigtigt, at du rejser dig helt op og sætter dig ned, for ellers tæller det ikke med. Når jeg siger START på kommandoen klar-parat-START, skal du rejse og sætte dig så mange gange som muligt i 30 sekundær.
Vis testen i hurtigt tempo, så deltageren er klar over, at man skal gøre det så hurtigt som man kan.
Nu får du lov til at prøve 1-2 gange.
Før selve testen skal patienten øve 1-2 oprejsninger for at sikre den korrekte teknik
Klar -parat- START

Antal oprejsninger

Oprejsninger_____

(1)❑ ≤8 Pause i 10 min. Her besvares spørgsmål

(2)❑>8. Tak for hjælpen

(3)❑Patienten har under indlæggelsen kunnet sidde selvstændigt på en almindelig stol, men orker ikke på undersøgelsestidspunktet pga. smerter, lufthunger, træthed mv.

Rekruttering, deltagerinformation og samtykke

De seneste 2 uger
Har du inden for de seneste 2 uger haft problemer med dine daglige aktiviteter på grund af dit fysiske helbred?

(1) ❑ Jeg har det meste af tiden har problemer med mine daglige aktiviteter	(2) ❑ Jeg har noget af tiden haft problemer med mine daglige aktiviteter	(3) ❑ Jeg har på intet tidspunkt været begrænset i at udføre mine daglige aktiviteter	(4) ❑ Ikke svaret / for træt

Faldepisoder

Er du faldet indenfor de sidste 3 mdr - op til denne indlæggelse?

(1) ❑ Ja (2) ❑ Nej (3) ❑ Ved ikke

DEMMI

Bruger patienten et gangredskab - EN FORDEL AT FINDE GANGREDSKABET NU

RESULTAT: RESULTATET SKAL VURDERES UD FRA PATIENTENS FØRSTE FORSØG. VED TVIVL - VÆLG DET LAVESTE POINT.

Når pausen er slut.....Du skal ikke gennemfører opgaven, hvis du ikke har lyst, synes den er for svær e.lign.

Nu skal jeg se, hvor let eller svært det er for dig at komme rundt når du ligger, sidder, står og går. Vi starter med, at du lægger dig i sengen / mens du ligger i sengen. Jeg fortæller dig hele tiden, hvad du skal gøre. Nu går vi i gang.

Opgave 1

Du skal bøje dine knæ og sætte fødderne på lagnet/sengen/underlaget, og lade fødderne blive der. Nu skal du løfte bagdelen (som hvis du skal have et bækken).

Bækkenløft - patienten skal løfte så højt, at tester kan få en "flad hånd" ind under bagdelen

(1) ❑ 0= Kan ikke (2) ❑ 1= Kan

Opgave 2

Nu skal du rulle om på siden uden at gribe fat i noget.

Når opgaven er udført, så må du godt komme tilbage igen. armlænene

Rulle om på siden

(1) ❑ 0= Kan ikke (2) ❑ 1= Kan

Opgave 3

Denne gang skal jeg bede dog om at komme op at sidde på sengekanten uden at gribe fat i noget

Balance – PATIENTEN SKAL NU FLYTTE SIG TIL EN STOL

(1) ❑ 0= Kan ikke	(2) ❑1= Minimal støtte = hands on, dvs. fysisk støtte-primært guidende	(3) ❑1= Supervision = en person overvåger aktiviteten uden at yde fysisk støtte. Supervision kan omfatte mundtlig instruks	(4) ❑2= Kan selvstændigt - tilstedeværelse af en anden person er ikke nødvendigt for sikker mobilitet

Opgave 4

Jeg skal bede dig om at lægge hænderne i skødet og sidde opret uden at støtte dit til ryglæn eller armlæn i 1o sekunder. Du skal holde knæ og fødderne samlet.

Sidde uden støtte – FØDDERNE HVILER PÅ GULVET (EN SKAMMEL, HVIS NØDVENDIGT)

(1) ❑ 0= Kan ikke (2) ❑ 1= 10 sekunder

Opgave 5

Du må godt sætter fødderne lidt fra hinanden igen. Nu skal du op at stå. Rejs dig op ved at støtte dig til armlænene.

Siddende til stående - GANGREDSKABET MÅ GODT STÅ FORAN PATIENTEN

(1) ❑ 0= Kan ikke	(2) ❑ 1= Minimal støtte = hands on, dvs. fysisk støtte-primært guidende	(3) ❑ 1= Supervision = en person overvåger aktiviteten uden at yde fysisk støtte. Supervision kan omfatte mundtlig instruks	(4) ❑ 2= Kan selvstændigt - tilstedeværelse af en anden person er ikke nødvendigt for sikker mobilitet

Opgave 6

Denne gang skal du prøve på at rejse dig op med armene krydset over brystet.

Siddende til stående uden brug af arme - GENNEMFØRES IKKE - RESULTATET AF 30S-RSS BRUGES

(1) ❑ 0= Kan ikke (2) ❑ 1= Kan

HVIS DER ER BRUG FOR EN PAUSE FX. PGA ÅNDENØD ER DET NU PAUSEN HOLDES - MAX 10 MIN.

- af hygiejniske grunde - må patienten godt beholde sygehussko, hjemmesko på.
- hvis patienten har støttestrømper, bandager eller lign. skal patienten beholde sine sko på.
- opgaverne skal udføres uden ekstra støtte

- Hvis patienten er meget usikker eller svajer meget skal opaverne ikke gennemføres

Opgave 7

Nu skal du stå 10 sekunder uden at støtte dig til noget. Jeg starter tiden når du slipper

Stå uden støtte. PATIENTEN MÅ STØTTE SIG TIL SENGEGAVLEN MV. NÅR PATIENTEN SKAL INDTAGE POSITIONEN

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 8

Nu skal du stå med fødderne samlet i 10 sekunder uden at støtte dig til noget. Jeg starter tiden, når du slipper

Stå med samlede fødder

Stå på tæer

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 9

Du må godt sætte fødderne lidt fra hinanden igen, og holde ved sengegavl/sengeshest/gangbarre.

Denne gang skal jeg se om du kan stå på tæer, dvs. hælene skal løftes fri fra underlaget.

Du skal stå på tæer i 10 sekunder, uden at støtte dig til noget. Jeg starter tiden, når du slipper.

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 10

Nu skal du stå med den ene fod foran den anden ligesom på en linje.

Du må selv vælge hvilken fod der er forrest. ....

HVIS PERSONEN SER UD TIL AT KUNNE STÅ I STILLINGEN FORTSÆTTES MED:

Luk dine øjne og bliv stående i 10 sekunder. Jeg starter tiden, når du slipper og har lukket øjnene.

Tandemstand med lukkede øjne

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 11

Nu skal vi se, hvor langt du kan gå uden pause. Vi snakker ikke sammen undervejs. Du må godt starte nu.

- Hvis testen udføres på sengestue, er det okay, at person stopper på vej ud på gangen for at se om der er fri bane

- Testen slutter, hvis personen stopper for at hvile sig. Personen bruger det gangredskab, som er relevant på testtidspunktet. Vælg det som giver størst sikkerhed.

- Teste slutter når personen har tilbagelagt en distance på 50 m. (Det er ok at inkludere en vending og returgang) gangdistance m/u gangredskab

Gangdistance m/ gangredskab

(1) ❑ 0 = Kan ikke	❑ Intet gangredskab
(2) ❑ 0 = 5 meter	❑ Gangramme
(3) ❑ 1 = 10 meter	❑ Rollator
(4) ❑ 1 = 20 meter	❑ Stok
(5) ❑ 2 = 50 meter	❑ Andet

Opgave 12

Selvstændig gangfunktion vurderes af tester på en strækning op til maksimalt 50 m.

Selvstændig gangfunktion

(1) ❑ 0 = Kan ikke	(2) ❑ 0 = Minimal støtte = hands on, dvs. fysisk støtte-primært guidende	(3) ❑ 0 = Supervision= en person overvåger aktiviteten uden at yde fysisk støtte. Supervision kan omfatte mundtlig instruks	(4) ❑1 = Kan selvstændigt med gangredskab - tilstedeværelse af en anden person er ikke nødvendigt for sikker mobilitet	(5) ❑2 = Kan selvstændigt uden gangredskab

Patienten står med siden til en sengegavl. En stol er placeret bagved og tester er stående ved siden af patienten

Opgave 13

Nu lægger jeg en kuglepen på gulvet foran dine fødder og jeg skal bede dig om at samle kuglepennen op uden at støtte tid til noget.

Samle kuglepen op fra gulvet - PERSONEN STÅR OP OG MÅ GODT STØTTE SIG TIL NOGET UNDER INSTRUKTIONEN.

(1)❑ 0 = Kan ikke (2)❑ 1 = Kan

Opgave 14

Du skal nu gå 4 skridt baglæns

Gå 4 skridt baglæns- GANGEN SKAL VÆRE SIKKER OG STABIL

(1)❑ 0 = Kan ikke (2)❑ 1 = Kan

Opgave 15

Til sidst skal jeg bede dig om at hoppe uden at støtte dig til noget

Hoppe - BEGGE FØDDER SKAL LØFTES FRA GULVET. AFSÆT OG LANDING SKAL FORETAGES MED GOD STABILITET.

(1)❑ 0 = Kan ikke (2)❑ 1 = Kan

Orientering- hukommelse og koncentrationstest

Nogle ældre har svært ved at huske det, de skal gøre. Det er vigtigt, at jeg får indtryk af, hvordan du husker og hvordan du løser nogle få opgaver

Jeg stiller et spørgsmål ad gangen...
Der skal ikke oplyses om svaret var rigtigt eller forkert under testen..

Hvilket årstal har vi? (1) ❑ Rigtig (2)❑ Forkert

Hvilken måned er vi I? (1) ❑ Rigtig (2)❑ Forkert

Gentag efter mig: Peter Jensen, Vestergade 77, Kolding eller Fredericia

Hvad er klokken? (1) ❑ Rigtig (2)❑ Forkert

Det skal sikres at den ældre ikke har et synligt armbåndsur eller at der ikke er et ur i synsretningen

Tæl baglæns fra 20 til 1 (1)❑Ingen fejl = 4 (2)❑En fejl = 2 (3)❑Flere fejl = 0 (4)❑Vil ikke svare

Sig månederne i omvendt rækkefølge (1)❑Ingen fejl = 4 (2)❑En fejl = 2 (3)❑Flere fejl = 0 (4)❑Vil ikke svare

December, November, Oktober, September, August. Juli, Juni, Maj, April, Marts, Februar, Januar

Gentag sætningen fra før
Peter Jensen, Vestergade 77.. Kolding eller Fredericia

(1) ☐☐ Antal huskede ord x2.
(Max 5x2 – hus nr tæller som et ord.

(Rækkefølgen af svar ligegyldig). Husk antallet af ord, som blev husket i sætningen ovenfor

Antal lægeordinerede præparater _____

IKO rapport eller indlæggelsesrapport)

(1) ❑ Ja (2) ❑ Nej (3) ❑Ikke haft kontakt til kommunen

Antal hospitalsindlæggelser indenfor de seneste 30 dage før den aktuelle indlæggelse
Oplysningen hentes i COSMIC
Angiv antallet af genindlæggelser (Akutafd, og andre afdelinger)

Vurderingen afsluttet

(1) ☐☐ Patienten er ikke habil

(2) ☐☐ Terapeuten ikke til stede i afdelingen/ patienten udskrevet

(3) ☐☐Pt. for dårlig - kan ikke sidde på en stol

(4) ☐☐ Habitue lt har patienten ikke en gangfunktion

(5) ❑ Patienten ønsker ikke at deltage

adspurgt og ønskede ikke at deltage

(6) ☐☐ Pt. taler ikke dansk tidligere inkluderet

(7) ❑ Pt. / tidlig ere

(8) ☐☐Patienten scorer over 8

(9) ❑Vurderingen gennemført

(10) ☐☐Andet

Prospective cohort study, Studies I–II: Follow- up data

CPR

Gennemførelse af opfølgningen ca 14 dage efter indlæggelsestidspunktet	(1)❑Nej	(2)❑Ja	
Testen gennemføres	(1) ❑ Hjemme hos patienten	(2) ❑ På sygehuset	(3) ❑ Aflastningsplads e.lign
Testen gennemføres d.			

30- sekunder rejse-sætte sig / Verbal instruktion til tester (i kursiv)
Vi skal finde ud af, hvor stærk du er i dine ben, ved at se, hvor mange gange du kan rejse dig fra en stol og sætte dig på 30 sekunder. Jeg viser dig lige, hvordan testen skal udføres.
Vis testen, først i langsomt tempo for at demonstrerer teknikken
Sæt dig midt på stolen (med ret ryg) og fødderne ved siden af hinanden. Håndleddene krydser du og lægger hænderne fladt på brystet. Det er vigtigt, at du rejser dig helt op og sætter dig ned, for ellers tæller det ikke med. Når jeg siger START på kommandoen klar-parat-START, skal du rejse og sætte dig så mange gange som muligt i 30 sekundær.
Vis testen i hurtigt tempo, så deltageren er klar over, at man skal gøre det så hurtigt som man kan.
Nu får du lov til at prøve 1-2 gange.
Før selve testen skal patienten øve 1-2 oprejsninger for at sikre den korrekte teknik
Klar -parat- START

Antal oprejsninger Oprejsninger_____	(1)❑ ≤8 Pause i 10 min. Her besvares spørgsmål	(2)❑>8. Tak for hjælpen	(3)❑Patienten har under indlæggelsen kunnet sidde selvstændigt på en almindelig stol, men orker ikke på undersøgelsestidspunktet pga. smerter, lufthunger, træthed mv.

Habituel funktionsevne	(1) Det klarer jeg uden hjælp	(2) Det klarer jeg med hjælp
Af- og påklædning	❑	❑
Toiletbesøg	❑	❑
Bruse- og /eller karbad	❑	❑
Madlavning	❑	❑
Rengøring	❑	❑
Indkøb af dagligvarer	❑	❑

Faldepisoder

Er du faldet siden udskrivelsen fra sygehuset ?

(1) ❑ Ja antal _____ (2) ❑ Nej _____ (3) ❑ Ved ikke

Ganghjælpemidler

Er du siden udskrivelsen fra sygehuset begyndt at anvende et ganghjælpemiddel (stok, rollator), når du færdes indenfor?	(1) ❑Ja, hele tiden	(2) ❑Ja, noget af tiden	(3) ❑Anvender på samme måde som inden indlæggelsen
Er du siden udskrivelsen fra sygehuset begyndt at anvende et ganghjælpemiddel (stok, rollator), når du færdes udenfor?	(1) ❑Ja, hele tiden	(2) ❑Ja, noget af tiden	(3) ❑Anvender på samme måde som inden indlæggelsen

DEMMI

Bruger patienten et gangredskab - EN FORDEL AT FINDE GANGREDSKABET NU
RESULTAT: RESULTATET SKAL VURDERES UD FRA PATIENTENS FØRSTE FORSØG. VED TVIVL - VÆLG DET LAVESTE POINT.
Når pausen er slut.....Du skal ikke gennemfører opgaven, hvis du ikke har lyst, synes den er for svær e.lign.
Nu skal jeg se, hvor let eller svært det er for dig at komme rundt når du ligger, sidder, står og går. Vi starter med, at du

lægger dig i sengen / mens du ligger i sengen. Jeg fortæller dig hele tiden, hvad du skal gøre. Nu går vi i gang.

Opgave 1

Du skal bøje dine knæ og sætte fødderne på lagnet/sengen/underlaget, og lade fødderne blive der. Nu skal du løfte bagdelen (som hvis du skal have et bækken).

Bækkenløft - patienten skal løfte så højt, at tester kan få en "flad hånd" ind under bagdelen

(1) ❑ 0= Kan ikke (2) ❑ 1= Kan

Opgave 2

Nu skal du rulle om på siden uden at gribe fat i noget.

Når opgaven er udført, så må du godt komme tilbage igen. armlænene

Rulle om på siden

(1) ❑ 0= Kan ikke (2) ❑ 1= Kan

Opgave 3

Denne gang skal jeg bede dog om at komme op at sidde på sengekanten uden at gribe fat i noget

Balance – PATIENTEN SKAL NU FLYTTE SIG TIL EN STOL

(1) ❑ 0= Kan ikke	(2) ❑1= Minimal støtte = hands on, dvs. fysisk støtte-primært guidende	(3) ❑1= Supervision = en person overvåger aktiviteten uden at yde fysisk støtte. Supervision kan omfatte mundtlig instruks	(4) ❑2= Kan selvstændigt - tilstedeværelse af en anden person er ikke nødvendigt for sikker mobilitet

Opgave 4

Jeg skal bede dig om at lægge hænderne i skødet og sidde opret uden at støtte dit til ryglæn eller armlæn i 1o sekunder. Du skal holde knæ og fødderne samlet.

Sidde uden støtte – FØDDERNE HVILER PÅ GULVET (EN SKAMMEL, HVIS NØDVENDIGT)

(1) ❑ 0= Kan ikke (2) ❑ 1= 10 sekunder

Opgave 5

Du må godt sætter fødderne lidt fra hinanden igen. Nu skal du op at stå. Rejs dig op ved at støtte dig til armlænene.

Siddende til stående - GANGREDSKABET MÅ GODT STÅ FORAN PATIENTEN

(1) ❑ 0= Kan ikke	(2) ❑ 1= Minimal støtte = hands on, dvs. fysisk støtte-primært guidende	(3) ❑ 1= Supervision = en person overvåger aktiviteten uden at yde fysisk støtte. Supervision kan omfatte mundtlig instruks	(4) ❑ 2= Kan selvstændigt - tilstedeværelse af en anden person er ikke nødvendigt for sikker mobilitet

Opgave 6

Denne gang skal du prøve på at rejse dig op med armene krydset over brystet.

Siddende til stående uden brug af arme - GENNEMFØRES IKKE - RESULTATET AF 30S-RSS BRUGES

(1) ❑ 0= Kan ikke (2) ❑ 1= Kan

HVIS DER ER BRUG FOR EN PAUSE FX. PGA ÅNDENØD ER DET NU PAUSEN HOLDES - MAX 10 MIN.

- af hygiejniske grunde - må patienten godt beholde sygehussko, hjemmesko på.
- hvis patienten har støttestrømper, bandager eller lign. skal patienten beholde sine sko på.
- opgaverne skal udføres uden ekstra støtte
- Hvis patienten er meget usikker eller svajer meget skal opaverne ikke gennemføres

Opgave 7

Nu skal du stå 10 sekunder uden at støtte dig til noget. Jeg starter tiden når du slipper

Stå uden støtte. PATIENTEN MÅ STØTTE SIG TIL SENGEGAVLEN MV. NÅR PATIENTEN SKAL INDTAGE POSITIONEN

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 8

Nu skal du stå med fødderne samlet i 10 sekunder uden at støtte dig til noget. Jeg starter tiden, når du slipper

Stå med samlede fødder

Stå på tæer

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 9

Du må godt sætte fødderne lidt fra hinanden igen, og holde ved sengegavl/sengeshest/gangbarre.

Denne gang skal jeg se om du kan stå på tæer, dvs. hælene skal løftes fri fra underlaget.

Du skal stå på tæer i 10 sekunder, uden at støtte dig til noget. Jeg starter tiden, når du slipper.

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 10

Nu skal du stå med den ene fod foran den anden ligesom på en linje.

Du må selv vælge hvilken fod der er forrest. ....

HVIS PERSONEN SER UD TIL AT KUNNE STÅ I STILLINGEN FORTSÆTTES MED:

Luk dine øjne og bliv stående i 10 sekunder. Jeg starter tiden, når du slipper og har lukket øjnene.

Tandemstand med lukkede øjne

(1) ❑ 0=Kan ikke (2) ❑ 1=10 sek.

Opgave 11

Nu skal vi se, hvor langt du kan gå uden pause. Vi snakker ikke sammen undervejs. Du må godt starte nu.

- Hvis testen udføres på sengestue, er det okay, at person stopper på vej ud på gangen for at se om der er fri bane

- Testen slutter, hvis personen stopper for at hvile sig. Personen bruger det gangredskab, som er relevant på testtidspunktet. Vælg det som giver størst sikkerhed.

- Teste slutter når personen har tilbagelagt en distance på 50 m. (Det er ok at inkludere en vending og returgang) gangdistance m/u gangredskab

Gangdistance m/ gangredskab

(1) ❑ 0 = Kan ikke ❑ Intet gangredskab

(2) ❑ 0 = 5 meter ❑ Gangramme

(3) ❑ 1 = 10 meter ❑ Rollator

(4) ❑ 1 = 20 meter ❑ Stok

(5) ❑ 2 = 50 meter ❑ Andet

Opgave 12

Selvstændig gangfunktion vurderes af tester på en strækning op til maksimalt 50 m.

Selvstændig gangfunktion

(1) ❑ 0 = Kan ikke	(2) ❑ 0 = Minimal støtte = hands on, dvs. fysisk støtte-primært guidende	(3) ❑ 0 = Supervision= en person overvåger aktiviteten uden at yde fysisk støtte. Supervision kan omfatte mundtlig instruks	(4) ❑1 = Kan selvstændigt med gangredskab - tilstedeværelse af en anden person er ikke nødvendigt for sikker mobilitet	(5) ❑2 = Kan selvstændigt uden gangredskab

Patienten står med siden til en sengegavl. En stol er placeret bagved og tester er stående ved siden af patienten

Opgave 13

Nu lægger jeg en kuglepen på gulvet foran dine fødder og jeg skal bede dig om at samle kuglepennen op uden at støtte tid til noget.

Samle kuglepen op fra gulvet - PERSONEN STÅR OP OG MÅ GODT STØTTE SIG TIL NOGET UNDER INSTRUKTIONEN.

(1)❑ 0 = Kan ikke (2)❑ 1 = Kan

Opgave 14

Du skal nu gå 4 skridt baglæns

Gå 4 skridt baglæns- GANGEN SKAL VÆRE SIKKER OG STABIL

(1)❑ 0 = Kan ikke (2)❑ 1 = Kan

Opgave 15

Til sidst skal jeg bede dig om at hoppe uden at støtte dig til noget

Hoppe - BEGGE FØDDER SKAL LØFTES FRA GULVET. AFSÆT OG LANDING SKAL FORETAGES MED GOD STABILITET.

(1)❑ 0 = Kan ikke (2)❑ 1 = Kan

Patientforløb	(1)❑Vurderingen er gennemført	(2) ❑ Patienten ønsker ikke besøg	(3)❑Det har ikke været muligt at træffe patienten	(4)❑Pt. fortsat indlagt/genindlagt ikke KS/ indlagt for dårlig til besøg

(5)❑Mors (6)❑Patienten for dårlig til at besøget kan gennemføres

RCT, Study III: Baseline data

Personlige oplysninger

CPR

Navn

Kommune (1) ❑ Fredericia (2) ❑ Kolding (3) ❑ Middelfart

Patienten er tidligere registreret I SurveyXAct

Repondentnøgle

Rekrutteret Fredericia Sygehus (1) ❑ Fredericia Sygehus

Patienten ikke opsøgt/vurdere fordi Deltagelse (1) ❑Ikke habil, taler ikke dansk, kan ikke sidde på en stol mv (2)❑Patienten ønsker ikke at deltage (3)❑ Ikke habil, ikke hab gangfunktion / dårlig- kan ikke sidde på en stol

Anvendelse af ganghjælpemidler

Anvender du normalt et ganghjælpemiddel (stok, rollator), når du færdes indenfor? (1)❑Rollator (2)❑Stol (3)❑Andet

Anvender du normalt et ganghjælpemiddel (stok, rollator), når du færdes udenfor? (1)❑Rollator (2)❑Stol (3)❑Andet

Vurdering af eget helbred
Hvordan synes du, dit helbred er alt i alt?
(Fokus er ikke dagen i dag, men generelt) (1)❑Fremragende (2)❑Vældig godt (3)❑ Godt (4)❑Mindre godt (5)❑Dårligt

Patientens fysiske aktivitetsniveau

Deltager ud udover daglige gøremål i moderat fysisk aktivitet (altså aktiviteter der er så anstrengende, at dit åndedræt og puls øges, og du kommer til at svede) (Gang er ok, hvis gangen er i et tempo/varighed der giver øget puls)

(1) ❑ Mere end tre gange om ugen (2) ❑ Mindre end tre gange om ugen (3) ❑ Slet ikke (4) ❑ Ikke spurgt / for træt

30- sekunder rejse-sætte sig / Verbal instruktion til tester (i kursiv)
Vi skal finde ud af, hvor stærk du er i dine ben, ved at se, hvor mange gange du kan rejse dig fra en stol og sætte dig på 30 sekunder. Jeg viser dig lige, hvordan testen skal udføres.
Vis testen, først i langsomt tempo for at demonstrerer teknikken
Sæt dig midt på stolen (med ret ryg) og fødderne ved siden af hinanden. Håndleddene krydser du og lægger hænderne fladt på brystet. Det er vigtigt, at du rejser dig helt op og sætter dig ned, for ellers tæller det ikke med. Når jeg siger START på kommandoen klar-parat-START, skal du rejse og sætte dig så mange gange som muligt i 30 sekundær.
Vis testen i hurtigt tempo, så deltageren er klar over, at man skal gøre det så hurtigt som man kan.
Nu får du lov til at prøve 1-2 gange.
Før selve testen skal patienten øve 1-2 oprejsninger for at sikre den korrekte teknik
Klar -parat- START

Antal oprejsninger Oprejsninger_____	(1)❑ ≤8 Inkluderes i undersøgelsen	(2)❑>8 Patientens fysiske funktionsniveau betyder, at patienten ikke vurderes i risiko for funktionsnedsættelse. Tak for hjælpen	(3)❑Inkluderes I undersøgelsen (Patienten har under indlæggelsen kunnet sidde selvstændigt på en almindelig stol, men orker ikke på undersøgelsestidspunktet pga. smerter, lufthunger, træthed mv.)

Rekruttering, deltagerinformation og samtykke

Deltagerinformation	(1) ❑ Deltagerinformation udleveret og gennemgået
Samtykke	(1) ❑ Patienten har afgivet samtykke til deltagelse (2) ❑ Patienten ønsker ikke deltage

Boform	(1) ❑Alene	(2) ❑Samboende	(3) ❑ Plejehjem / aflastningshjem
Uddannelse	(1) ❑ Nej	(2) ❑ Et eller flere kortere kurser (specialarbejderkurser, arbejdsmarkedskurser m.v.)	(3) ❑ Erhvervsfaglig uddannelse /faglært (kontor-eller butiksassistent, frisør, murer, lægesekretær, social-og sundhedshjælper, landmand)
	(4) ❑ Kort videregående uddannelse, 2-3 år (markedsøkonom, politibetjent, laborant, maskintekniker, økonoma, tandplejer) (7) ❑ Anden uddannelse	(5) ❑ Mellemlang videregående uddannelse 3-4 år (folkeskolelærer, socialrådgiver, sygeplejerske, fysioterapeut, pædagog)	(6) ❑ Lang videregående uddannelse mere end 4 år (civilingeniør, cand,mag, læge, psykolog)

Orientering- hukommelse og koncentrationstest

Nogle ældre har svært ved at huske det, de skal gøre. Det er vigtigt, at jeg får indtryk af, hvordan du husker og hvordan du løser nogle få opgaver

Jeg stiller et spørgsmål ad gangen...
Der skal ikke oplyses om svaret var rigtigt eller forkert under testen..

Hvilket årstal har vi?	(1) ❑ Rigtig	(2)❑ Forkert
Hvilken måned er vi I?	(1) ❑ Rigtig	(2)❑ Forkert
Gentag efter mig: Peter Jensen, Vestergade 77, Kolding eller Fredericia		
Hvad er klokken? Det skal sikres at den ældre ikke har et synligt armbåndsur eller at der ikke er et ur i synsretningen	(1) ❑ Rigtig	(2)❑ Forkert

Tæl baglæns fra 20 til 1	(1)❑Ingen fejl = 4	(2)❑En fejl = 2	(3)❑Flere fejl = 0	(4)❑Vil ikke svare
Sig månederne i omvendt rækkefølge	(1)❑Ingen fejl = 4	(2)❑En fejl = 2	(3)❑Flere fejl = 0	(4)❑Vil ikke svare

December, November, Oktober, September, August. Juli, Juni, Maj, April, Marts, Februar, Januar

Gentag sætningen fra før Peter Jensen, Vestergade 77.. Kolding eller Fredericia (Rækkefølgen af svar ligegyldig). Husk antallet af ord, som blev husket i sætningen ovenfor	(1) ❑ Antal huskede ord x2. (Max 5x2 – hus nr tæller som et ord.

Barthel

1. Spisning	(1)❑Selvhjulpen - Kan spise normal (ikke kun blød kost), maden må være	(2)❑Hjælpekrævende - Behøver vejledning eller hjælp til udskæring, smøre	(3)❑Kan selv ikke - Skal mades eller sondemades	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er

	tilberedt og serveret af andre, men ikke skåret ud	brød osv. men kan selv betjene spiseredskaber		spørgsmålet: Kan du på nuværende tidspunkt selv klare.....

(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)

2. Forflytning fra seng til stol	(1)❑Selvhjulpen - Fra seng til stol og tilbage (også bremse evt. kørestol)	(2)❑Let hjælpekrævende - Har brug for vejledning eller hjælp fra højst en person	(3)❑Meget hjælpekrævende - Kan sidde selv, men har bug for vejledning eller hjælp fra en trænet/stærk person, to personer eller lift	(4) ❑Kan slet ikke - Har ingen siddende balance Det er siddende balance som afgør forskel mellem meget hjælpekrævende og kan slet ikke ved tvivl fx. ved brug af lift.

(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)

3. Personlig Hygiejne	(1)❑Selvhjulpen - Kan børste tænder, rede håret, barbere sig, vaske ansigtet (redskaber kan være lagt frem)	(2)❑Hjælpekrævende - Har brug for vejledning eller hjælp	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare.....

(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)

4. Toiletbesøg	(1)❑Selvhjulpen - Selvstændigt til og fra toilet/toiletstol, tage tøjet af og på, tørre sig og vaske hænder	(2)❑Nogen hjælp - Kan tørre sig selv, plus væsentlig del af: af/påklædning, komme til/fra og vaske hænder	(3)❑Afhængig af hjælp - Kan ikke tørre sig selv, må have vejledning eller hjælp til alt	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare.....

(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)

5. Badning	(1)❑Selvhjulpen - Kan selv komme ind/ud af badekar/bruser og vasker sig selv over det hele	(2)❑ Hjælpkrævende - Har brug for vejledning eller hjælp	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare.....

(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)

6. Mobilitet indendørs	(1)❑Selvhjulpen - Går uden personstøtte ved indendørs gang (gerne med stok, rollator eller andre ganghjælpemidler)	(2)❑Let hjælpkrævende - Går (indendørs) med vejledning eller hjælp fra højest en utrænet person	(3)❑ Meget hjælp/kørestol - Færdes i kørestol uden hjælp (inklusiv komme om hjørner og igennem døre): eller gang med støtte af mere end en person	(4)❑Kan slet ikke - Immobil (har brug for hjælp til kørestol) Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
7. Trappegang	(1)❑Selvhjulpen - Selvhjulpen på trapper op og ned (bærer selv eventuelt ganghjælpemiddel)	(2)❑Hjælpkrævende - Har brug for vejledning eller personstøtte, hjælp til at bære ganghjælpemiddel el. lign	(3)❑Kan slet ikke - Kan ikke gå på trappe	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
8. Påklædning	(1)❑Selvhjulpen - Klarer alt selv, inklusiv knapper, lynlås, snørrebånd osv	(2)❑Hjælpkrævende - Kan tage noget tøj på selvstændigt (ca halvdelen) (Hvis hjælpen kun omfatter støttestrømper, da er patienten selvhjulpen)	(3)❑Kan slet ikke - Afhængig af hjælp	Hvis patienten ikke har gennemført opgaven under indlæggelsen, anvendes: Kan du på nuværende tidspunkt selv klare.....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
9. Tarmkontrol - seneste uge	(1)❑Kontinent eller klarer selv klysme eller lignende indenfor den sidste uge	(3)❑Lejlighedsvis ufrivillig afføring - (ca en gang om ugen) og/eller beov for vejledning til klysma eller lignende	(3)❑Inkontinent eller får klysma af andre	Hvis patienten ikke har gennemført opgaven under indlæggelsen, anvendes: Kan du på nuværende tidspunkt selv klare....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
10. Blærekontrol	(1)❑Kontinent eller klarer selv kateter eller lignende uden hjælp (indenfor den sidste uge)(hvis pt. har fået kateter i forbindelse med indlæggelsen - og ellers er kontinent - da er pt. kontinent)	(2)❑ Lejlighedsvis urin inkontinent, højst en gang daglig	(3)❑Inkontinent - eller skal have hjælp til kateder, pose eller andet	Hvis patienten ikke har gennemført opgaven under indlæggelsen, anvendes: Kan du på nuværende tidspunkt selv klare.....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				

EQ-5D-3L				
Bevægelighed	(1)❑Jeg har ingen problemer med at gå omkring	(2)❑Jeg har nogle problemer med at gå omkring	(3)❑Jeg er bundet til sengen	4)❑Missing - patienten svarer ved ikke(nødknap)
Personlig pleje	(1)❑Jeg har ingen problemer med min personlige pleje	(2)❑Jeg har nogle problemer med at vaske mig eller klæde mig på	(3)❑Jeg kan ikke vaske mig eller klæde mig på	(4)❑Missing - patienten svarer ved ikke(nødknap)
Sædvanlige aktiviteter (fx. arbejde, husarbejde, familie - eller fritidsaktiviteter)	(1)❑Jeg har ingen problemer med at udføre mine sædvanlige aktiviteter	(2)❑Jeg har nogle problemer med at udføre mine sædvanlige aktiviteter	(3)❑Jeg kan ikke udføre mine sædvanlige aktiviteter	(4)❑ Missing - patienten svarer ved ikke(nødknap)
Smerter / ubehag	(1)❑Jeg har ingen smerter eller ubehag	(2)❑Jeg har moderater smerter eller ubehag	(3)❑Jeg har ekstreme smerter eller ubehag	(4)❑ Missing - patienten svarer ved ikke(nødknap)
Angst / depression	(1)❑Jeg er ikke ængstelig eller deprimeret	(2)❑Jeg er moderat ængstelig eller deprimeret	(3)❑Jeg er ekstremt ængstelig eller deprimeret	(4)❑ Missing - patienten svarer ved ikke(nødknap)

Din egen helbredstilstand i dag_____

Vurderingen afsluttet				
	(1)❑Patienten er ikke habil def. ved at patienten ikke kan angive egne data, tid og sted	(2)❑Terapeuten ikke til stede i afdelingen/ patienten udskrevet / hjemsendt på orlov	(3)❑Pt. for dårlig - kan ikke sidde på en stol - sengeliggende, ukontaktbar mv	(4)❑Habituelt har patienten ikke en gangfunktion
	(5)❑Patienten ønsker ikke at deltage	(6)❑I 30sRSS scorer pt. over 8	(7)❑Pt. taler ikke dansk / har ikke sprog (fx afasi)	(8)❑ Pt. tidligere inkluderet / tidligere adspurgt og ønskede ikke at deltage
	(9)❑ Vurderingen gennemført	(10)❑ Patienten må ikke være fysisk aktiv under indlæggelsen	(11)❑Patienten er terminal/palliativ def.ved at træning/genoptræning virker uetisk i situationen	(12)❑ Patienten har en progredierende kognitiv eller neurologisk lidelse
	(13)❑Andet	(14)❑Pt. trukket samtykke tilbage efter randomisering	(15)❑Via ambulatorium , dialysen, dvs. ikke via akutafdelingen- inkl. elektive	

RCT, Study III: Hospital data

CPR

Opfølgningsdato 30 dage efter indlæggelsestidspunktet

Forløb 1)❑Opfølgningen gennemføres ikke - mors (2)❑Opfølgningen gennemføres ikke - samtykke trukket tilbage (3)❑Opfølgningen gennemføres

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DEMMI score (Akutafd) (1)_____

Udskrivelse fra Akutafdeling eller overflytning (Journal) (1)❑Udskrevet til eget hjem (2)❑Overflyttet til anden afdeling

Vægt og højde (Journal) Patientens vægt (1) ❑ ikke angivet Patientens vægt (1) ❑ ikke angivet

Patientens højde (1) ❑ ikke angivet Patientens højde (1) ❑ ikke angivet

Polyfarmaci (Journal)

Indlæggelsesdato (COSMIC) Indlæggelsesdato_____ Udskrivelsesdato _____

Genindlæggelse (1)❑Ja Antal genindlæggelser ___ (2) ❑ Nej

Patientforløb (1)❑Data indsamlet (2)❑Mors (3)❑Samtykket trukket tilbage

RCT, Study III: Municipality data

CPR

Navn

Forløb

Indlæggelsesdato _____ Udskrivelsesdato _____

Kommune (1)❑Fredericia (2)❑Kolding (3)❑Middelfart

KOLDING / FREDERICIA MIDDELFART KOMMUNER. (1)❑Patienten er ikke oprettet i det kommunale system (2)❑På indlæggelsestidspunktet havde patienten ikke indenfor de sidste 6 mdr. haft pleje-kontakt / Pt. modtager ikke pleje. (3)❑Patienten er I kontakt med kommunen. (4)❑Kontakten var privat leverandør (5)❑Patienten har kun modtaget pleje kortvarigt op til indlæggelsen/ I kontakt med kommunen

Kommunal kontakt op til indlæggelsen. (6)❑Andet

GOP er modtager I kommunen d. Dato

Træningsforløb (hold, individuelt, Rehabilitering, Døgnophold, Låsbyhøj,Den dato der indgår I hurtig opstart Dato

Fortsættelse af træning baseret på GOP sendt i tidligere indlæggelsesforløb. Dato: Dagen efter udskrivelsen Dato

Patienten er i et træningsforløb baseret på initiativ af primærsektoren (e.læge mv) Dato: Dagen efter udskrivelsen Dato

Hverdagsrehabilitering iværksat inden indlæggelsen . Dato: Dagen efter udskrivelsen Dato

Hverdagsrehabilitering, iværksat i forbindelse med den aktuelle indlæggelse - baseret på et kommunalt initiativ i form af nyt eller ændret plejebehov. Datoen = Dato for forundersøgelse i PLEJEMODUL Dato

Afslutning (1) ❑Data indsamlet

RCT, Study III: Follow-up data

Opfølgningsdato

Respondentnøgle

Kontaktoplysninger (1) ❑Fredericia (2) ❑Kolding (3) ❑Middelfart

Dato for første gang, hvor I kontakter borgeren mht. aftale tid for besøg.

Giver Morten og jeg mulighed for at se, at I har modtaget information om dataindsamling og at I er i færd med at aftale tid for besøg.

Juster tallet for hver gang I forsøger, at kontakte borgeren.

Atter information til Morten og jeg. :) TAK

Vedr. opfølgning (1) ❑Gennemføres hjemme hos borgeren (2) ❑I forbindelse med træning (3) ❑Gennemføres ikke (4) ❑Aflastning (5) ❑Sygehuset

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30- sekunder rejse-sætte sig / Verbal instruktion til tester (i kursiv)
Vi skal finde ud af, hvor stærk du er i dine ben, ved at se, hvor mange gange du kan rejse dig fra en stol og sætte dig på 30 sekunder. Jeg viser dig lige, hvordan testen skal udføres.
Vis testen, først i langsomt tempo for at demonstrerer teknikken
Sæt dig midt på stolen (med ret ryg) og fødderne ved siden af hinanden. Håndleddene krydser du og lægger hænderne fladt på brystet. Det er vigtigt, at du rejser dig helt op og sætter dig ned, for ellers tæller det ikke med. Når jeg siger START på kommandoen klar-parat-START, skal du rejse og sætte dig så mange gange som muligt i 30 sekundær.
Vis testen i hurtigt tempo, så deltageren er klar over, at man skal gøre det så hurtigt som man kan.
Nu får du lov til at prøve 1-2 gange.
Før selve testen skal patienten øve 1-2 oprejsninger for at sikre den korrekte teknik
Klar -parat- START

Antal oprejsninger Oprejsninger _____

Barthel

1. Spisning	(1)❑Selvhjulpen - Kan spise normal (ikke kun blød kost), maden må være tilberedt og serveret af andre, men ikke skåret ud	(2)❑Hjælpekrævende - Behøver vejledning eller hjælp til udskæring, smøre brød osv. men kan selv betjene spiseredskaber	(3)❑Kan selv ikke - Skal mades eller sondemades	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare.....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
2. Forflytning fra seng til stol	(1)❑Selvhjulpen - Fra seng til stol og tilbage (også bremse evt. kørestol)	(2)❑Let hjælpekrævende - Har brug for vejledning eller hjælp fra højst en person	(3)❑Meget hjælpekrævende - Kan sidde selv, men har bug for vejledning eller hjælp fra en trænet/stærk person, to personer eller lift	(4) ❑Kan slet ikke - Har ingen siddende balance Det er siddende balance som afgør forskel mellem meget hjælpekrævende og kan slet ikke ved tvivl fx. ved brug af lift.
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				

3. Personlig Hygiejne	(1)❑Selvhjulpen - Kan børste tænder, rede håret, barbere sig, vaske ansigtet (redskaber kan være lagt frem)	(2)❑Hjælpekrævende - Har brug for vejledning eller hjælp		Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare.....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
4. Toiletbesøg	(1)❑Selvhjulpen - Selvstændigt til og fra toilet/toiletstol, tage tøjet af og på, tørre sig og vaske hænder	(2)❑Nogen hjælp - Kan tørre sig selv, plus væsentlig del af: af/påklædning, komme til/fra og vaske hænder	(3)❑Afhængig af hjælp - Kan ikke tørre sig selv, må have vejledning eller hjælp til alt	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare.....
5. Badning	(1)❑Selvhjulpen - Kan selv komme ind/ud af badekar/bruser og vasker sig selv over det hele	(2)❑ Hjælpkrævende - Har brug for vejledning eller hjælp		Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare.....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
6. Mobilitet indendørs	(1)❑Selvhjulpen - Går uden personstøtte ved indendørs gang (gerne med stok, rollator eller andre ganghjælpemidler)	(2)❑Let hjælpkrævende - Går (indendørs) med vejledning eller hjælp fra højest en utrænet person	(3)❑ Meget hjælp/kørestol - Færdes i kørestol uden hjælp (inklusiv komme om hjørner og igennem døre): eller gang med støtte af mere end en person	(4)❑Kan slet ikke - Immobil (har brug for hjælp til kørestol) Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
7. Trappegang	(1)❑Selvhjulpen - Selvhjulpen på trapper op og ned (bærer selv eventuelt ganghjælpemiddel)	(2)❑Hjælpkrævende - Har brug for vejledning eller personstøtte, hjælp til at bære ganghjælpemiddel el. lign	(3)❑Kan slet ikke - Kan ikke gå på trappe	Hvis patienten ikke har gennemført opgaven under indlæggelsen, er spørgsmålet: Kan du på nuværende tidspunkt selv klare
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				

8. Påklædning	(1)❑Selvhjulpen - Klarer alt selv, inklusiv knapper, lynlås, snørebånd osv	(2)❑Hjælpkrævende - Kan tage noget tøj på selvstændigt (ca halvdelen) (Hvis hjælpen kun omfatter støttestrømper, da er patienten selvhjulpen)	(3)❑Kan slet ikke - Afhængig af hjælp	Hvis patienten ikke har gennemført opgaven under indlæggelsen, anvendes: Kan du på nuværende tidspunkt selv klare.....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
9. Tarmkontrol - seneste uge	(1)❑Kontinent eller klarer selv klysme eller lignende indenfor den sidste uge	(3)❑Lejlighedsvis ufrivillig afføring - (ca en gang om ugen) og/eller beov for vejledning til klysma eller lignende	(3)❑Inkontinent eller får klysma af andre	Hvis patienten ikke har gennemført opgaven under indlæggelsen, anvendes: Kan du på nuværende tidspunkt selv klare....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				
10. Blærekontrol	(1)❑Kontinent eller klarer selv kateter eller lignende uden hjælp (indenfor den sidste uge)(hvis pt. har fået kateter i forbindelse med indlæggelsen - og ellers er kontinent - da er pt. kontinent)	(2)❑ Lejlighedsvis urin inkontinent, højst en gang daglig	(3)❑Inkontinent - eller skal have hjælp til kateder, pose eller andet	Hvis patienten ikke har gennemført opgaven under indlæggelsen, anvendes: Kan du på nuværende tidspunkt selv klare.....
(1)❑ Patientens svar (2)❑ Observationer (plejen tp) (3)❑ Pårørende (4)❑ Missing - patienten svarer ved ikke (nødknap)				

EQ-5D-3L

Bevægelighed	(1)❑Jeg har ingen problemer med at gå omkring	(2)❑Jeg har nogle problemer med at gå omkring	(3)❑Jeg er bundet til sengen	4)❑Missing - patienten svarer ved ikke(nødknap)
Personlig pleje	(1)❑Jeg har ingen problemer med min personlige pleje	(2)❑Jeg har nogle problemer med at vaske mig eller klæde mig på	(3)❑Jeg kan ikke vaske mig eller klæde mig på	(4)❑Missing - patienten svarer ved ikke(nødknap)

Sædvanlige aktiviteter (fx. arbejde, husarbejde, familie - eller fritidsaktiviteter)	(1)❑Jeg har ingen problemer med at udføre mine sædvanlige aktiviteter	(2)❑Jeg har nogle problemer med at udføre mine sædvanlige aktiviteter	(3)❑Jeg kan ikke udføre mine sædvanlige aktiviteter	(4)❑ Missing - patienten svarer ved ikke(nødknap)
Smerter / ubehag	(1)❑Jeg har ingen smerter eller ubehag	(2)❑Jeg har moderater smerter eller ubehag	(3)❑Jeg har ekstreme smerter eller ubehag	(4)❑ Missing - patienten svarer ved ikke(nødknap)
Angst / depression	(1)❑Jeg er ikke ængstelig eller deprimeret	(2)❑Jeg er moderat ængstelig eller deprimeret	(3)❑Jeg er ekstremt ængstelig eller deprimeret	(4)❑ Missing - patienten svarer ved ikke(nødknap)

Din egen helbredstilstand i dag_____

Vurderingen afsluttet	(1)❑Patienten er ikke habil def. ved at patienten ikke kan angive egne data, tid og sted	(2)❑Terapeuten ikke til stede i afdelingen/ patienten udskrevet / hjemsendt på orlov	(3)❑Pt. for dårlig - kan ikke sidde på en stol - sengeliggende, ukontaktbar mv	(4)❑Habituelt har patienten ikke en gangfunktion
	(5)❑Patienten ønsker ikke at deltage	(6)❑I 30sRSS scorer pt. over 8	(7)❑Pt. taler ikke dansk / har ikke sprog (fx afasi)	(8)❑ Pt. tidligere inkluderet / tidligere adspurgt og ønskede ikke at deltage
	(9)❑ Vurderingen gennemført	(10)❑ Patienten må ikke være fysisk aktiv under indlæggelsen	(11)❑Patienten er terminal/palliativ def.ved at træning/genoptræning virker uetisk i situationen	(12)❑ Patienten har en progredierende kognitiv eller neurologisk lidelse
	(13)❑Andet	(14)❑Pt. trukket samtykke tilbage efter randomisering	(15)❑Via ambulatorium , dialysen, dvs. ikke via akutafdelingen- inkl. elektive	

Borgertilfredshedsundersøgelse

I hvilken grad oplever du, at du har været involveret i beslutningen om hvorvidt du har behov for kommunal genoptræning?
Der spørges til om borgeren under indlæggelsen har oplevet at være involveret i beslutningen om kommunal genoptræning.
Genoptræning kan være almindelig genoptræning, Styrk din hverdag/ Kolding eller Længst muligt i eget hjem/Fredercia, Hverdagsrehabilitering/Middelfart, Trænende hjemmehjælper /Fredericia, Træningsassistenter/Kolding, Hjemmetræner/Middelfart. Kort sagt alt der ydes med henblik på at holde borgeren aktiv

(1) ❑ Jeg har i høj grad været involveret
(2) ❑ Jeg har i nogen grad været involveret
(3) ❑ Jeg har i mindre grad været involveret
(4) ❑ Jeg har slet ikke været involveret
(5) ❑Ved ikke / husker ikke
(6) ❑Ikke relevant(hvis borgeren ikke er blevet tilbudt genoptræning/ træning)

I hvilken grad er du enig i beslutningen omkring dit genoptræningsbehov?	(1) ❑ Jeg er i høj grad enig (2) ❑ Jeg er i nogen grad enig (3) ❑ Jeg er i mindre grad enig (4) ❑ Jeg er slet ikke enig (5) ❑Ved ikke / husker ikke (6) ❑Ikke relevant(hvis borgeren ikke er blevet tilbudt genoptræning/ træning)
I hvilken grad oplever du, at du efter udskrivelsen fra sygehuset har haft de hjælpemidler fx. stokke / rollator mv. til rådighed, som er nødvendig for at du kan være fysisk aktiv	(1) ❑ I høj grad mulighed for at være fysisk aktiv (2) ❑ I nogen grad mulighed for at være fysisk aktiv (3) ❑ I mindre grad mulighed for at være fysisk aktiv (4) ❑ Slet ikke mulighed for at være fysisk aktiv (5) ❑Ved ikke / husker ikke (6) ❑Ikke relevant(hvis borgeren ikke er blevet tilbudt genoptræning/ træning)
I hvilken grad oplever du tiden fra udskrivelse fra sygehuset til opstarten af kommunal træning som passende?	(1) ❑ Tiden opleves passende i høj grad (2) ❑ Tiden opleves passende i nogen grad (3) ❑ Tiden opleves passende i mindre grad (4) ❑ Tiden opleves slet ikke passende (6) ❑Ikke relevant(hvis borgeren ikke er blevet tilbudt genoptræning/ træning)
I hvilken grad oplevede du, at den kommunale terapeut ved jeres første møde var tilstrækkelig orienteret om dit indlæggelsesforløb?	(1) ❑ Terapeuten var i høj grad orienteret (2) ❑ Terapeuten var i nogen grad orienteret (3) ❑ Terapeuten var i mindre grad orienteret (4) ❑ Terapeuten var slet ikke orienteret (5) ❑Ved ikke / husker ikke (6) ❑Ikke relevant(hvis borgeren ikke er blevet tilbudt genoptræning/ træning)
I hvilken grad oplever du, at genoptræningen giver mening for dig?	(1) ❑ Træningen giver i høj grad mening (2) ❑ Træningen giver i nogen grad mening (3) ❑ Træningen giver i mindre grad mening (4) ❑ Træningen giver slet ikke mening (5) ❑Ved ikke / husker ikke (6) ❑Ikke relevant(hvis borgeren ikke er blevet tilbudt genoptræning/ træning)
I hvilken grad oplever du, at du har været inddraget i planlægningen af det kommunale træningstilbud?	(1) ❑ Jeg har i høj grad været inddraget (2) ❑ Jeg har i nogen grad været inddraget (3) ❑ Jeg har i mindre grad været inddraget (4) ❑ Jeg har slet ikke været inddraget (5) ❑Ved ikke / husker ikke (6) ❑Ikke relevant(hvis borgeren ikke er blevet tilbudt genoptræning/ træning)
Hvor tilfreds er du alt i alt med den træning du har modtaget i	(1) ❑ Jeg har i høj grad tilfreds med den

kommunen?			kommunale træning (2) ❑ Jeg har i nogen grad tilfreds med den kommunale træning (3) ❑ Jeg har i mindre grad tilfreds med den kommunale træning (4) ❑ Jeg er slet ikke tilfreds med den kommunale træning (5) ❑Ved ikke / husker ikke
Patientforløb	(1)❑ Vurderingen er gennemført	(2)❑Borgeren ønsker aktuelt ikke besøg, men må gerne kontaktes igen om 3 mdr.	(3)❑ Borgeren ønsker aktuelt ikke besøg, og ønsker ikke at blive kontaktet om 3 mdr.
	(4)❑ Det har ikke været muligt at træffe borgeren	(5) ❑ Mors	(6)❑ Borgeren for dårlig til at besøget kan gennemføres, men må gerne kontaktes igen om 3 mdr.
	(7) ❑ Borgeren for dårlig til at besøget kan gennemføres, ønsker ikke at blive kontaktet om 3 mdr.	(8)❑ Patienten har trukket sit samtykke tilbage (anvendes kun af sygehuset)	(9)❑ Andet

9.3. Appendix C: Study III: Functional assessment (Danish)

Navn: **CPR** **Stue: Normal___/ Hurtig ___**

Indlæggelsesårsag:		Ja	Nej
Daglige aktiviteter – udvikling over tid	Føler du dig almindeligvis frisk nok til at gennemføre det, som du har lyst til? *Def: Almindeligvis: Inden for det sidste ½ år.*		
	Er der bestemte daglige aktiviteter, som du gennem det sidste ½ år er stoppet med at gennemføre eller som du oplever besvær med at gennemføre på grund af dit fysiske helbred? *Def: Daglige aktiviteter = de aktiviteter patienten anser som daglige*		
	Har du inden for de sidste 4 uger op til indlæggelsen haft problemer med at udføre dine daglige aktiviteter på grund af dit fysiske helbred?		
Vurderer du at patientens evne til at klare de daglige aktiviteter ændret sig (sidste ½ år; 4 uger) *Hvis er det væsentligt at sætte ind med mobilisering/træning for at undgå ADL-tab på sigt*			
Mobilitet – udvikling over tid	Kan du almindeligvis uden besvær gå 400 meter uden hvil		
	– hvis nej, er besværlighederne begyndt indenfor det sidste ½ år?		
	Kan du almindeligvis uden hvil gå op eller ned ad en trappe fra en etage til en anden uden at hvile? *Hvis patienten ikke går på trapper: da "vil du tro du kan."*		
	– hvis nej, er besværlighederne med trappegang begyndt indenfor det sidste ½ år?		
	Kan du almindeligvis bære 5 kg. (fx indkøbsposer)). At holde noget løftet, idet man fører det med sig over kortere/længere afstande. Kan den ældre selv bære indkøbsposen hjem		
	– hvis nej, er besværlighederne med at bære ting begyndt indenfor det sidste ½ år?		
Vurderer du at patienten har begyndende funktionsnedsættelse / "mobilitetsnedsættelse"? *Pt. som ikke kan en eller flere af ovenstående opgaver vurderes at have nedsat mobilitet)* *Ved nedsat mobilitet kan det være væsentligt med mobilisering/træning for at undgå ADL-tab på sigt*			
Fald-vurdering	Har du været faldet indenfor det sidste år? *Def: Et fald =en utilsigtet hændelse, hvor en person lander på jorden eller andet lavere niveau.*		
	Oplever du, at du i det daglige kan have balance-gangproblemer?		
	Føler du dig til tider svimmel?		
Vurderer du at patienten er i risiko for at falde??. *Hvis begyndende kan udredning / træning være relevant. Hvis kendt problem – væsentligt at minimere risiko under og efter indlæggelsen*			
Vanlig ADL	Har du almindeligvis brug for hjælp til toiletbesøg, af-og påklædning, bad og/eller madlavning/modtager mad udefra? *Def: Ja, hvis brug for hjælp til en af opgaverne / Def; Hjælpen kan være fra nabo, børn, ægtefælle, kommunen. / Def: Kun hjælp til støttestrømper: Ikke vanligvis hjælp til ADL-aktiviteter.*		
	Har du oplevet at behovet har ændret sig indenfor de sidste ca. 3 mdr.?		
Vurderer du, at ADL-behovet er ændret i forbindelse med indlæggelsen/den sidste tid op til indlæggelsen? *Hvis begyndende kan udredning mobilisering/træning være relevant.*			
Vanlig ADL	Har du almindeligvis brug for hjælp fra andre til rengøring og andre mere fysisk krævende opgaver		
	-hvis ja; oplever patienten at behovet har ændres sig den sidste tid/½ år?		
Vurderer du at behovet for støtte til mere fysiske opgaver har ændret sig den sidste tid/ ½ år (max)? *Hvis ændring, evt tegn på begyndende funktionsnedsættelse, og mobilisering/ træning er derfor relevant*			
Mobilitet og gang-hjælpemidler	Anvender du vanligvis et ganghjælpemiddel, når du færdes udenfor? *Def: Dropfodsskinne er ikke at betragte som et ganghjælpemiddel*		
	-hvis ja og hvis patienten har trapper. Er det da et problem at få ganghjælpemidlet op og ned af trapperne?		
	Anvender du vanligvis og i flere situationer et ganghjælpemiddel, når du færdes indenfor?		
Træning	Deltager du aktuelt i træningsaktiviteter?		
	Hvis nej, har du indenfor de sidste 3 mdr. deltaget i træningsaktiviteter?		
	Hvis ja, til træningsaktivitet aktuelt og/eller 3 mdr. – Var det en kommunal træningsaktivitet?		
Øvrigt	Har patienten flere konkurrerende lidelser, som har betydning for det fysiske funktionsniveau?		
	Har patienten været indlagt en eller flere gange de sidste 6 mdr.		
	Er patienten "sengekær"/ i risiko for funktionsnedsættelse under indlæggelsen på grund af "inaktivitet"		
	Patienten er motiveret for at træne?		

Vurdering af den aktuelle mobilitet / balance (DEMMI)

Seng (forflytninger)	0	1	2
1. Bækkenløft	Kan ikke	Kan	
2. Rulle om på siden	Kan ikke	Kan	
3. Liggende til siddende	Kan ikke	Minimal støtte Supervision	Kan selvstændigt
Stol (forflytninger)			
4. Sidde uden støtte	Kan ikke	10 sek	
5. Siddende til stående	Kan ikke	Minimal støtte Supervision	Kan selvstændigt
6. Siddende til stående uden brug af arme	Kan ikke	Kan	
Statisk balance (uden gangredskab)			
7. Stå uden støtte	Kan ikke	10 sek	
8. Stå med samlede fødder	Kan ikke	10 sek	
9. Stå på tæer	Kan ikke	10 sek	
10. Tandem med lukkede øjne	Kan ikke	10 sek	
Gang			
11. Gangdistance m/u gangredskab Gangredskab: intet, gangramme, rollator, stok, andet	Kan 5 meter	10 meter 20 meter	50 meter
12. Selvstændig gangfunktion	Kan ikke Minimal støtte Supervision	Kan selvstændigt med gangredskab	Kan selvstændigt uden gangredskab
Dynamisk balance (uden gangredskab)			
13. Samle kuglepen op fra gulvet	Kan ikke	Kan	
14. Gå 4 skridt baglæns	Kan ikke	Kan	
15. Hoppe	Kan ikke	Kan	
Total rå score: / 19 - DEMMIscore: / 100			

Rå	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Demmi	0	8	15	20	24	27	30	33	36	39	41	44	48	53	57	62	67	74	85	100

Undersøgelsen skal altid suppleres med øvrige relevante undersøgelser og journalføring, ligesom der på baggrund af undersøgelsen skal iværksættes relevant fysioterapeutisk behandling.

Afslutningsvis
Der er udarbejdet en GOP. ____
Der er udarbejdet en advis, men behovet for GOP skal vurderes inden udskrivelse.____
Der er udarbejdet en advis, og der er ikke behov for opfølgning.____
Der er ikke lavet GOP/Advis, men behovet for GOP skal vurderes inden udskrivelse.____
Der er ikke lavet GOP/Advis, og er ikke behov for opfølgning.____

9.4. Appendix D: Studies I–II: Declaration of written informed consent (Danish)

Samtykke til indhentning af oplysninger i IT-systemer/journaler

Projektets titel: **Genoptræningsbehovet hos akut indlagte ældre medicinske patienter.**

Loven kræver at der gives samtykke til indhentning af oplysninger i sygehusets journaler mv, når indhentningen af oplysninger ikke er direkte relateret til sygehusbehandlingen.

Vi vil spørge, om du vil give tilladelse til, at der indhentes oplysninger i sygehusets IT-systemer i forbindelse med et projekt, som har til formål

- dels at vurdere kvaliteten af to tests som anvendes til undersøgelse af funktionsevnen
- dels at finde frem til faktorer, som kan angive om der er et genoptræningsbehov efter den akutte indlæggelse.

Din beslutning vil ikke have indflydelse på den behandling du modtager under indlæggelsen.
Du kan også til enhver tid tilbagekalde din samtykkeerklæring.

Erklæring fra deltager

Jeg giver hermed min samtykke til, at det i forbindelse med ovenstående projekt er tilladt at indhente oplysninger relevante for projektet i følgende IT-systemer/journaler

- EPJ (sygehusets patientjournal)
- Indlæggelsesrapporten fra kommunen (gælder kun patienter som modtager kommunale service ydelser)
- Cetrea (klinisk logistisk system)
- Cosmic (patient administrativ system)
- Care (kommunens administrative system)

Deltagerens navn: _____

Deltagerens CPR: _____ Dato: _____

Underskrift _____

Kolding Sygehus
– en del af Sygehus Lillebælt

Region Syddanmark

9.5. Appendix E: Study III: Participant information (Danish)

Deltagerinformation

Effekten af en funktionsevnevurdering i det akutte patientforløb

Phd. studerende, Inge Hansen Bruun

Terapiafdelingen

Region Syddanmark

Kolding Sygehus
– en del af Sygehus Lillebælt

Deltagerinformation om deltagelse i et videnskabeligt forsøg, der handler om effekten af en funktionsevnevurdering under indlæggelsen i Akut sengeafsnit i kombination med hurtig opstart af kommunal træning.

Projektets titel
Effekten af en funktionsevnevurdering i det akutte patientforløb fra indlæggelse til opfølgning i kommunalt regi, et randomiseret klinisk forsøg.

Vi vil spørge, om du vil deltage i et sundhedsvidenskabeligt forskningsprojekt, der efter sygdom og indlæggelse skal vedligeholde eller forbedre funktionsevnen hos ældre medicinske patienter. Funktionsevnen omfatter mulighederne for at kunne varetage daglige aktiviteter som for eksempel påklædning og gang. Projektet er et samarbejde mellem Akutafdelingen og Terapiafdelingen Kolding Sygehus samt Fredericia Kommune og Kolding Kommune.

Hvis du indvilliger i at deltage i projektet vil du under alle omstændigheder i såvel sygehusregi som kommunalt regi få tilbudt, hvad der svarer til vanligt. Deltagelse i projektet er derfor forbundet med minimale gener og uden yderligere risici.

Formål med forsøget
Projektet har til formål at vedligeholde eller forbedre funktionsevnen hos ældre medicinske patienter med nedsat funktionsevne.
Omkring 336 patienter skal deltage i projektet fra april/maj 2015 og til slutningen af 2016.

Plan for forsøget
En projektmedarbejder vil i forbindelse med indlæggelsen i Akutafdelingen opsøge og informere dig om forskningsprojektet og ved en simpel fysisk test vurdere din funktionsevne. Hvis projektmedarbejderen vurderer, at du har nedsat funktionsevne, vil du dernæst blive bedt om, at tage stilling til din deltagelse i projektet. Da indlæggelsen i Akut sengeafsnit er kort, beder vi dig om at tilkendegive din beslutning i forbindelse med eller umiddelbart efter samtalen.

Deltagelse i forskningsprojektet
Deltagelse i projektet betyder, at vanlig behandling eventuelt suppleres med en udvidet fysioterapeutisk vurdering, og/eller at et eventuelt træningstilbud, hvis du accepterer at blive henvist til kommunal træning, kan starte umiddelbart efter din udskrivelse fra sygehuset.
Deltagelse i projektet betyder ligeledes, at faglige oplysninger opnået på baggrund af den udvidede fysioterapeutiske vurdering kan blive videregivet til de kommunale samarbejdspartnere.

Hvis du ikke modtager kommunale serviceydelser og det vurderes, at du efter indlæggelsen ikke har behov for kommunal genoptræning, vil du eventuelt blive kontaktet af en kommunal terapeut, der blot vil høre om alt, i forhold til funktionsevnen, fungerer hensigtsmæssigt.
Henholdsvis 3 uger og 3 mdr. efter din indlæggelse vil du få besøg af en projektmedarbejder, som atter vil vurdere din funktionsevne og bede dig besvare diverse spørgsmål. Tidspunktet for besøget aftaler du og projektmedarbejderen.

Nytte
Forsøget forventes at give en viden, som kan være med til at forbedre den fremtidige planlægning af de akutte patientforløb samt træningsforløbet fra sygehus til kommunal regi. For dig personligt vil projektmedarbejderens vurdering af din funktionsevne betyde, at du får oplyst, om du bør være opmærksom på din funktionsevne.

Bivirkninger, risici, komplikationer og ulemper
Da vanlige ydelser i sygehus- og kommunalt regi eventuelt suppleres med en udvidet fysioterapeutisk vurdering og/eller hurtig opstart af eventuelle kommunale træningsaktiviteter er deltagelsen i forbundet med minimale gener og uden yderligere risici.

Udelukkelse fra og afbrydelse af forsøg
Du vil udgå af projektet, hvis der under indlæggelsen eller efterfølgende opstår en situation, hvor henholdsvis den fysioterapeutiske vurdering eller eventuel planlagt træningsaktivitet ikke kan gennemføres.

Oplysninger om økonomiske forhold
Projektets totale budget er 2 mill. og der er opnået støtte fra Sygehus Lillebælt kr. 500.000, Region Syddanmark kr. 513.578 og. Danske Fysioterapeuters fond for forskning, uddannelse og praksisudvikling kr. 15.000. Øvrige udgifter finansieres af Terapiafdelingen, Kolding Sygehus. Initiativet til projektet er taget af de forsøgsansvarlige, der i øvrigt er uafhængige af private firmaer og fonde. Du vil for din deltagelse ikke modtage nogen form for vederlag.

Adgang til forsøgsresultater
Forsøgets resultater vil i starten af 2017 blive offentliggjort i videnskabelige tidsskrifter, på Sygehus Lillebælts hjemmeside samt Fredericia og Kolding Kommunes hjemmesider. Det sikres, at ingen patienter kan genkendes i det, som offentliggøres.

Vi håber, at du med denne information har fået tilstrækkeligt indblik i, hvad det vil sige at deltage i forsøget, og at du føler dig rustet til at tage beslutningen om din eventuelle deltagelse. Vi beder dig også om at læse det vedlagte materiale Forsøgspersoners rettigheder i et sundhedsvidenskabeligt forskningsprojekt.

Yderligere oplysninger kan fås ved henvendelse til nedenstående.

Med venlig hilsen

Inge Hansen Bruun,
Ph.d.-studerende, fysioterapeut, MR,
Terapiafdelingen, Kolding Sygehus
Skovvangen 2 8
6000 Kolding
Inge.Hansen.Bruun@rsyd.dk
Tlf.: 7636 2811

Forsøgspersoners rettigheder i et sundhedsvidenskabeligt forskningsprojekt

Som deltager i et sundhedsvidenskabeligt forskningsprojekt skal du vide at:

- Din deltagelse i forskningsprojektet er helt frivillig og kun kan ske efter, at du har fået både skriftlig og mundtlig information om forskningsprojektet og underskrevet samtykkeerklæringen
- Du til enhver tid mundtligt, skriftligt eller ved anden klar tilkendegivelse kan trække dit samtykke til deltagelse tilbage og udtræde af forskningsprojektet. Såfremt du trækker dit samtykke tilbage påvirker dette ikke din ret til nuværende eller fremtidig behandling eller andre rettigheder, som du måtte have
- Du har ret til at tage et familiemedlem, en ven eller en bekendt med til informationssamtalen
- Du har ret til betænkningstid, før du underskriver samtykkeerklæringen
- Oplysninger om dine helbredsforhold, øvrige rent private forhold og andre fortrolige oplysninger om dig, som fremkommer i forbindelse med forskningsprojektet, er omfattet af tavshedspligt
- Opbevaring af oplysninger om dig, herunder oplysninger i dine blodprøver og væv, sker efter reglerne i lov om behandling af personoplysninger og sundhedsloven
- Der er mulighed for at få aktindsigt i forsøgsprotokoller efter offentlighedslovens bestemmelser. Det vil sige, at du kan få adgang til at se alle papirer vedrørende din deltagelse i forsøget, bortset fra de dele, som indeholder forretningshemmeligheder eller fortrolige oplysninger om andre
- Der er mulighed for at klage og få erstatning efter reglerne i lov om klage- og erstatningsadgang inden for sundhedsvæsenet. Hvis der under forsøget skulle opstå en skade kan du henvende dig til Patienterstatningen, se nærmere på www.patienterstatningen.dk.

Dette tillæg er udarbejdet af det videnskabsetiske komitésystem og kan vedhæftes den skriftlige information om det sundhedsvidenskabelige forskningsprojekt.
Spørgsmål til et konkret projekt skal rettes til projektets forsøgsansvarlige.
Generelle spørgsmål til forsøgspersoners rettigheder kan rettes til den komité, som har godkendt projektet.

De Videnskabsetiske Komiteer for Region Hovedstaden (6 komiteer)
Tlf. 38 66 63 95
E-mail: vek@regionh.dk
Hjemmeside: www.regionh.dk/vek

Den Videnskabsetiske Komité for Region Sjælland
Tlf. 24 52 59 52 / 57 87 52 44
E-mail: RH-komite@regionsjaelland.dk
Hjemmeside: www.regionsjaelland.dk/videnskabsetisk-komite

De Videnskabsetiske Komiteer for Region Syddanmark (2 komiteer)
Tlf. 20 59 89 30 / 29 20 22 51 /29 20 22 52 / 29 20 12 03
E-mail: komite@rsyd.dk
Hjemmeside: www.regionsyddanmark.dk/komite

De Videnskabsetiske Komiteer for Region Midtjylland (2 komiteer)
Tlf. 78 41 01 81 / 78 41 01 82 /78 41 01 83
E-mail: komite@rm.dk
Hjemmeside: www.komite.rm.dk

Den Videnskabsetiske Komité for Region Nordjylland
Tlf. 97 64 84 40
E-mail: vek@rn.dk
Hjemmeside: www.vek.rn.dk

Den Nationale Videnskabsetiske Komité
Tlf.: +45 72 26 93 70
E-mail: dketik@dketik.dk
Hjemmeside: www.dnvk.dk
Revideret august 2014

9.6. Appendix F: Study III: Declaration of written informed consent (Danish)

DET VIDENSKABSETISKE KOMITÉSYSTEM

(S1)

Informeret samtykke til deltagelse i et sundhedsvidenskabeligt forskningsprojekt.

Forskningsprojektets titel: Effekten af en funktionsevnevurdering i det akutte patientforløb – fra indlæggelse til opfølgning i kommunalt regi, et randomiseret klinisk forsøg.

Erklæring fra forsøgspersonen:

Jeg har fået skriftlig og mundtlig information og jeg ved nok om formål, metode, fordele og ulemper til at sige ja til at deltage.

Jeg ved, at det er frivilligt at deltage, og at jeg altid kan trække mit samtykke tilbage uden at miste mine nuværende eller fremtidige rettigheder til behandling.

Jeg giver samtykke til, at deltage i forskningsprojektet, og har fået en kopi af dette samtykkeark samt en kopi af den skriftlige information om projektet til eget brug.

Forsøgspersonens navn: _____

Dato: _____ Underskrift: _____

Ønsker du at blive informeret om forskningsprojektets resultat samt eventuelle konsekvenser for dig?:

Ja _____ (sæt x) Nej _____ (sæt x)

Erklæring fra den, der afgiver information:

Jeg erklærer, at forsøgspersonen har modtaget mundtlig og skriftlig information om forsøget.

Efter min overbevisning er der givet tilstrækkelig information til, at der kan træffes beslutning om deltagelse i forsøget.

Navnet på den, der har afgivet information: Morten Gammelby Bleeg Jessen

Dato: _____ Underskrift: _____

Projektidentifikation: (Fx komiteens Projekt-ID, EudraCT nr., versions nr./dato eller lign.)

Projekt.ID: S-20130168; Anmeldelsesnr. 40556

Standardsamtykkeerklæring udarbejdet af Det Videnskabsetiske Komitésystem, november 2011.

Kolding Sygehus
- en del af Sygehus Lillebælt

Region Syddanmark

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