Patient characteristics in three different working models of home based physiotherapy: a longitudinal observational study in primary health care in Norway

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Abstract

Background: Home based physiotherapy is offered by Primary Care Physiotherapy Services to adults and older patients in Norway, however there is limited knowledge regarding the patient characteristics and outcome. The aim of this study was to describe the variation in demographics, clinical characteristics and outcomes of patients receiving three different working models of home based physiotherapy, and whether outcomes were related to goal attainment. **Methods:** Patients referred to home based physiotherapy in a municipality in Norway were invited to participate in this observational study. The respective physiotherapy service is organized in three working models according to the patients' function, degree of independence, and the individual need for home based physiotherapy; early intervention, reablement or regular physiotherapy. Patients' demographics, clinical characteristics, physical function (Patient-specific functional scale, PSFS), physical performance (Short Physical Performance Battery, SPPB), health-related quality of life (EQ-5D), and goal attainment were registered at baseline and follow-up (maximum six months after baseline). We used logistic regression to analyse whether changes in PSFS, SPPB, and EQ-5D were associated with goal attainment. **Results:** In total, 689 and 402 patients completed baseline and follow-up assessments, respectively. At baseline, patients receiving early intervention had better SPPB and EQ-5D scores than patients receiving reablement and regular physiotherapy. The two latter groups had similar SPPB scores, but the regular physiotherapy group had poorer EQ-5D scores than the reablement group. At follow-up, all patient groups had improved PSFS scores, and patients receiving reablement and regular physiotherapy also showed improved SPPB and EQ-5D scores. Among the 375 patients with goal attainment assessed at follow-up, 165 (44%) achieved the treatment goal. Goal attainment was associated with improved PSFS and EQ-5D scores. **Conclusions:** This study describes a broad spectrum of patient characteristics receiving different working models of home based physiotherapy in primary health care in Norway. The early intervention group is a new target group for prevention of functional decline in older adults, contributing with new knowledge to decision makers in primary health care.

Introduction

The Norwegian primary health care system offer home based physiotherapy services to older adults at risk of, or already experiencing, functional decline, reduced independence in daily life functions, or reduced quality of life. Changes in demography nationally and globally, with a higher proportion of older adults and increased longevity (1), along with limited resources in the health care system, emphasizes the importance of early prevention and postponing the need for home based services and residential care. Thus, knowledge about characteristics and treatment outcomes of patients receiving physiotherapy services is highly needed. Current home based physiotherapy services in Norway encompass patients who make contact with home based services for the first time to patients with complex health situations. Due to a wide variation in daily life functions, some patients need more simple offers and some need multiple health services or admission to nursing homes.

Recent studies from Norway show that the difference in mobility level and physical performance, measured by the Short Physical Performance battery (SPPB), are surprisingly similar between patients who make contact with home based services for the first time (2), and patients who are admitted to nursing homes (3). Langeland et al. (2019) investigated the effect of a home based rehabilitation model, termed “reablement”, in home-dwelling, older adults with a recent functional decline who were applying for home based services (2). Participants in this study were on average 78 years and characterized by moderately impaired physical function and reduced health-related quality of life. Reablement was associated with improved mobility, physical function, health-related quality of life, and high goal attainment. The sample is, however, not representative for the wide range of patients receiving home based physiotherapy, as the inclusion criteria were limited to patients who had experienced a recent functional decline. Thus, their results regarding patient characteristics and outcomes may therefore not be generalizable. Nevertheless, there are some evidence to suggest that patients who apply for home based services for the first time have comparable mobility levels as patients who already receive a range of home based services (4).

Home based physiotherapy services are differently organised and conceptualised within and between countries (2, 5-7), making comparisons across studies difficult. In Norway, attempts have been made to identify older adults at risk for functional decline at an early stage, a so-called “early intervention” model, to initiate prevention of functional decline and maintenance of independence in daily life. Reduced mobility and physical function in older adults have been shown to be related to increased risk of falling (8), reduced quality of life (9), all-cause mortality (10), and a range of other health and functional outcomes (11). Assessments of mobility and physical function may help in early identification of patients at risk for future functional decline (12, 13), and to tailor physiotherapy services in primary health care to the ageing population.

There is limited knowledge of patient characteristics describing the whole continuum, including characteristics, mobility level, and physical function, of patients that receive home based physiotherapy in Norway. The overall aim of this study was therefore to provide a descriptive overview of 1) demographic and clinical characteristics of the patient group receiving different models of home based physiotherapy in primary health care. Further, we assessed 2) changes in physical performance, physical function, and health-related quality of life from baseline to follow-up. We also examined 3) goal attainment at follow-up and associations between goal attainment and changes in physical performance, physical function, and health-related quality of life.

Materials And Methods

Design and setting

Through the Research program for Physiotherapy in Primary Health Care, the FYSIOPRIM, a set of standardized methods and tools have been developed, enabling studies of clinical courses for patients receiving primary care physiotherapy (14). The present study is a longitudinal observational study of

adults and older patients receiving physiotherapy, mainly home based, in Trondheim Municipality, which is located in the middle part of Norway. Trondheim has around 194 000 inhabitants and is the third largest municipality in Norway.

Home based physiotherapy services in Trondheim Municipality include three working models: “Regular physiotherapy”, “rehabilitation of activities of daily living” (hereafter called “reablement”), and “early intervention” (Figure 1). These working models are organized to target different patient groups and purposes within the primary health care system, as depicted by their relationship with primary prevention and more specialized health care (Figure 1). Physiotherapists (PTs) provide regular physiotherapy in home- or institutional settings, after referrals from home based services, health and welfare offices, hospitals, general practitioners, occupational services, or by proxy. Reablement and early intervention consist of strategies to prevent functional decline and promote independence in activities of daily life. Patients already receiving home based services can be referred to physiotherapy and receive reablement, where the PTs prescribe individualized exercise programs to patients with specific focus on activities of daily living. The exercise programs are followed up by the home based services. Patients who contact the health services for the first time and who are not currently receiving any other health care services may receive early intervention. The patients are typically independent in activities of daily living, but need walking aids, meal delivery services, cleaning services, and/or home care alarms. Early intervention is offered to postpone the patients’ need for home based services by education and empowerment to maintain function in activities of daily living. Early intervention consists of multidisciplinary rehabilitation, delivered by PTs, health and welfare officers, and occupational therapists.

Data was prospectively collected from May 2016 to May 2018. The study was conducted according to the Helsinki Declaration. Written informed consent was obtained from all patients. Ethical approval was granted by the Regional committees for Medical and Health Research Ethics in Norway (REC no. 2013/2030).

Participants

All adults (>18 years of age) referred to physiotherapy in Trondheim Municipality, Norway, were eligible for inclusion. Exclusion criteria were incapability of giving consent due to reduced cognitive function or not able to reach the next of kin. At baseline, 689 patients had their demographic and clinical information registered, of whom 495 (71.8%) patients received regular physiotherapy, 62 (9.0%) received reablement, and 132 (19.2%) received early intervention (Figure 2).

Data collection procedure

The PTs included patients at the initial home visit and used a tablet application for data collection. Data collection included self-report questionnaires and clinical tests at baseline and follow-up (14). In collaboration, the patient and the PT agreed on the main treatment goal and plan for treatment, which

were evaluated at follow-up, either at the end of treatment or six months after baseline for those who continued to receive physiotherapy.

Baseline assessment

At baseline, sex, age, living condition and cause of referral were registered for all patients. For patients receiving regular physiotherapy, we registered number of daily medications (0, 1-4, ≥ 5), self-reported height (cm) and weight (kg), smoking (yes/no), physical activity frequency (inactive, 1-3 times per week, approximately every day), use of walking aids (yes/no), number of falls last year (0, 1-2, ≥ 3), fear of falling (Likert scale 0-4), sleep and vitality status from the 15D questionnaire assessing health related quality of life (15) (Likert scale 1-5), and pain intensity last week (Numeric Rating Scale 0-10, where 0 indicated no pain and 10 worst imaginable pain). These variables were not registered for the early intervention and the reablement groups due to limited time for data registration during the cross-disciplinary collaboration.

Physical performance was assessed using the Short Physical Performance Battery (SPPB) (12). The SPPB consists of three tests: standing balance, 4-meter walking at preferred speed, and five times sit-to-stand. Each test is scored on a scale from 0 to 4, which gives a composite score from 0 to 12, where lower scores indicate greater functional impairment (12). Minimal clinically important change (MCIC) of the SPPB is defined as ≥ 1 point (16).

Physical function was assessed by using the Patient Specific Functional Scale (PSFS), which is validated for assessing changes in function for older adults (17). The patients were asked to identify up to three important activities, which they perceived as difficult to perform due to their condition. The patients rated each activity on a scale from 0 (inability to perform) to 10 (no problem to perform). MCIC of the PSFS in older adults is lacking, although a minimal detectable change is defined as 2.8 points (17). We used this together with results for MCIC from other patient groups (18) to define MCIC on the PSFS as ≥ 3 points. In the present study, the first activity indicated by the patient was used to assess change over time.

Health-related quality of life was assessed by using the EuroQol-5D-5L (EQ-5D) (19), which comprises health-related quality of life in five dimensions: mobility, self-care, usual activities, pain and discomfort, and anxiety and depression. Each of these dimensions has a five-level response option, and the answers are transformed into an index score by using the English population value set (20). The index score ranges between -0.285 (worst imaginable health state) and 1 (perfect health). MCIC of the EQ-5D is defined as ≥ 0.08 points (21).

Follow-up assessment

Goal attainment was assessed on a 3-point Likert scale by the question: "To which extent was your main treatment goal achieved?" The response options were 1) achieved, 2) partly achieved, and 3) not

achieved. The patients were reassessed by use of the SPPB, PSFS and EQ-5D.

Statistical analyses

Descriptive statistics were used to describe the patients using parametric or non-parametric statistics according to the data distribution. Mean baseline group differences in SPPB, PSFS and EQ-5D were analyzed by one-way ANOVA with Scheffé's post-hoc test. Complete case analyses of SPPB, PSFS and EQ-5D scores at baseline and follow-up were performed using paired sample t-test and scores presented as mean difference with 95% confidence intervals (CI) for the total patient group, and for each working model separately; regular physiotherapy, reablement and early intervention. In addition, the proportion of older adults achieving MCIC on the SPPB, PSFS and EQ-5D were calculated, and the chi-square test was used to test the difference in proportions achieving MCIC in the three working models.

Logistic regression analyses were performed to examine associations between goal attainment (achieved vs. partly or not achieved) and changes in SPPB, PSFS, and EQ-5D. Odds ratios with 95% CI were reported. For the logistic regression analyses we multiplied the change scores for the EQ-5D by 10 to ease interpretation and comparison with the odds ratios for SPPB and PSFS. To assess the impact of missing data, we compared age, sex, living condition and cause of referral as well as results of the clinical tests at baseline between patients with baseline and follow-up data (complete cases) and patients with baseline data only. Analyses were performed in STATA 15.1 (StataCorp. 2017. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC). P-values less than 0.05 were considered statistically significant.

Results

Baseline assessment

The most frequent causes of referral to physiotherapy were geriatrics/functional deterioration with or without falls (25.8%), early intervention (19.2%), orthopedic (14.2%) and neurological conditions (10.5%), musculoskeletal disorders (9%), reablement (9%) and other (12.3%). Overall, physiotherapy treatment consisted mostly of gait training, activities of daily living, and stair walking. The most frequently used exercises were strengthening exercises and balance/stability/coordination exercises.

The total patient sample had a median age of 83 (interquartile range, IQR: 75-88) years and 64.2% were females. The regular physiotherapy group had a median age of 82 (IQR: 72-88) years. Within this group, older adults referred to physiotherapy because of geriatrics/ functional deterioration had a median age of 86.5 (IQR: 81-90) years. The reablement group had a median age of 85 (IQR 80-88) years, and the early intervention group a median age of 83 (IQR: 79-87) years. The latter group had a higher proportion of females (73.5%) compared with the regular physiotherapy (61.4%) and the reablement group (67.2%) ($p=0.03$).

Table 1 shows the baseline demographic and clinical characteristics of the patients in the regular physiotherapy group (n=495). Within this group, most patients (92.4%) lived in their own home; more than half (55.3%) were living alone, while 37.1% were living with a spouse. Two-thirds of the patients reported having one or more falls within the last year, and half reported no ability to get up from the floor on their own. There was a high proportion of patients reporting other symptoms such as moderately to extremely weariness (55.7%) and moderate to severe sleep problems (37.7%), and they reported a moderate pain intensity level (Table 1).

Table 2 shows the baseline SPPB, PSFS and EQ-5D scores. The early intervention group had higher SPPB scores than the regular physiotherapy and reablement groups, whereas PSFS scores were similar across groups. The early intervention group had the highest EQ-5D scores, followed by the reablement group and the regular physiotherapy group. Patients living in institution (=36) had similar scores on SPPB, PSFS, and EQ-5D as those receiving regular home based physiotherapy.

Follow-up assessment

Table 2 shows the overall and within group mean changes (95% CI) in SPPB, PSFS and EQ-5D scores for patients with baseline and follow-up data (complete cases). In the total patient sample, mean SPPB scores increased by 0.9 (95% CI: 0.6 to 1.1) points, mean PSFS scores by 2.3 (95% CI: 1.8 to 2.8) points, and mean EQ-5D scores by 0.10 (95% CI: 0.07 to 0.12) points. The regular physiotherapy and reablement groups showed significant changes in SPPB, PSFS and EQ-5D scores, while the early intervention group only showed significant changes in PSFS scores (mean change:1.7; 95% CI: 0.8 to 2.6). Number of patients with clinically relevant changes in SPBB, PSFS, and EQ-5D scores varied from 30% to nearly 60% across the different working models (Table 2).

Of the 375 patients with goal attainment registered at follow-up, the main treatment goal was 'achieved' in 165 (44.0%), 'partly achieved' in 129 (34.4%), and not achieved in 81 (21.6%). There were no significant differences in degree of goal attainment between the three groups. Changes from baseline to follow-up in PSFS and EQ-5D scores were significantly associated with goal attainment, also when we adjusted for sex, age, and group (Table 3). SPPB scores was not significantly associated with goal attainment. A sensitivity analysis, excluding patients living in institution did not change the results.

Missing data

There were no significant differences in baseline demographic and clinical characteristics between complete cases and patients missing follow-up data. One exception was that complete cases in the regular physiotherapy and reablement groups had higher baseline SPPB scores than patients missing follow-up data, although not statistically significant in the reablement group (regular physiotherapy: 6.1 (SD 2.5) vs. 5.2 (SD 2.9), $p=0.02$; reablement: 5.7 (SD 2.5) vs 4.6 (SD 2.7), $p=0.13$).

Discussion

The present study is the first to describe the broad spectrum of patients referred to home based physiotherapy in a primary health care setting in Norway. The patients were heterogeneous in terms of degree of functional deterioration and in health-related quality of life across the different models of home based physiotherapy, although minor differences were observed between those receiving reablement and regular physiotherapy. The early intervention group had better physical performance and health-related quality of life compared with the other two groups. The regular physiotherapy group and the reablement group improved their physical performance, physical function, and health-related quality of life after treatment, while early intervention improved on PSFS. Changes in physical function and health-related quality of life were associated with goal attainment.

Strengths and limitations

Strengths of the present study were the systematic collection of data of all patients receiving home based physiotherapy services, the inclusion of self-reported and objective measures of physical performance before and after physiotherapy, and the inclusion of data on goal attainment. We included patients living in institutions, as they also received physiotherapy from the municipally employed PT. However, they constituted only a minor part of the total patient sample and the characteristics were similar to the patients receiving home based physiotherapy. Therefore, we believe the term home based physiotherapy is representative for the total patient sample in this study. Not all patients referred to home based physiotherapy were eligible for inclusion. Reasons for exclusion were reduced cognitive function incapable of giving consent or the PT not being able to reach the next of kin, language barriers for non-Norwegian speaking patients and ethical concerns for patients receiving palliative care. We have previously reported that sex and age distribution of adult and older patients included in FYSIOPRIM were comparable to those not included, although a higher proportion of non-included patients were living in institutions and more often referred because of geriatrics/functional deterioration (14). As a result, our sample may have had better physical performance compared with the broad spectrum of patients receiving home based physiotherapy. There was a considerable amount of missing data at follow-up. However, we did not find any baseline differences in demographic and clinical characteristics between those with and without complete follow-up data, except complete cases in the regular physiotherapy group had higher SPPB scores than patients missing data at follow-up. As the present study relied on assessments by up to 55 different PTs during clinical encounters with the patients (14), inter-rater reliability bias may have occurred, as well as potential desirability bias as all patient-reported outcome measures were registered with the PT present. We assume, however, that the inter-rater reliability bias was low, because the SPPB is already an integrated part of the physiotherapy practice and most PTs are experienced users of the instrument.

Patient characteristics at baseline

Patients receiving physiotherapy were mostly older adults with only a small proportion below 65 years of age. Patients receiving regular physiotherapy with geriatrics/functional deterioration as cause of referral were only slightly older than those receiving reablement and early intervention. With a median age of 86.5 years, these patients represents an older patient group compared with other studies of home-dwelling older adults with comparable inclusion criteria (2, 22-26), and similar age to those admitted to nursing homes (3).

Patients receiving home based physiotherapy were heterogeneous in terms of functional impairment, ranging from moderate (SPPB summary score 4-6) to low (SPPB summary score 7-9) functional impairment (12, 27). Interestingly, the early intervention group, which consists of older adults seeking home based services from the primary health care system for the first time, had an already decreased mobility level that is associated with increased risk for developing long-term mobility-related disability (13). This indicates that physiotherapy or other preventive interventions can be initiated at an even earlier stage to decrease the risk for long-term mobility-related disability. However, by use of the model for early intervention, patients were identified at an earlier stage of the functional decline, as shown by the SPPB scores, than previously reported (2). Early identification of patients at risk for functional decline may have important implications for the patients, as they can prevent functional decline and even improve function in daily activities perceived as important for them, as shown by the significant improvement in PSFS. Thus, the model for early intervention seems promising, but further studies are needed to evaluate the effect of the model.

The mobility level in the reablement and the regular physiotherapy groups was similar, considerable poorer than in the early intervention group, and similar to a recent study investigating older adults receiving reablement or usual care in primary health care (2). However, the latter study did not distinguish between patients receiving reablement and usual care. In the present study, the regular physiotherapy group had poorer health-related quality of life compared to the reablement group, that indicates that older adults receiving regular physiotherapy have a more complex health situation. This is in line with the differentiation in working models made by the municipality for patients receiving reablement versus the regular physiotherapy group, where the latter receive more comprehensive interventions.

Identification of older adults at risk for developing long-term disability is important to secure an independent life by postponing the need for health care services, admission to nursing homes, and hospitalization. A recent study from Norway investigating mobility level and performance in 697 older adults at admission to nursing homes reported a median SPPB score of 4 (IQR: 5) points (3). The difference in mobility level between older adults in the current study and older adults admitted to nursing homes are therefore surprisingly small. Interventions such as reablement, where patients are at a higher mobility level, has thus the potential to initiate physiotherapy at an earlier stage and potentially postponing admissions to nursing homes. Identification of older adults at risk for functional decline, and thus a potential candidate for reablement, was mostly dependent on the home based services in the current study. However, the current screening performed by the home based services are based on subjective evaluations. Home based services personnel may thus play a key role in systematic screening

and early identification of patients in need of interventions targeted to maintain physical functions, as they are the health personnel that first meet the older adults in their homes.

Changes from baseline to follow-up

The reablement and the regular physiotherapy group had comparable changes in mobility and health-related quality of life, and in proportion of patients achieving clinically meaningful improvement on these outcomes. The early intervention group had only minor changes in these outcomes. These results reflect the different aims and target groups of the working models, where the early intervention was targeted at prevention of functional decline, and not necessarily improvement. However, the early intervention group showed similar changes in PSFS scores as the other groups. In the current study, the PTs and the patients collaborated to identify the most important activities at the start of treatment, and they evaluated the progress after the treatment. Setting goals and identifying activity limitations in collaboration with the PT may have increased patients' motivation and satisfaction and thus may have led to attainable, purposeful and functional goals (28-30). The study results showed the close relationship between changes in activities or functions perceived as important for the patient and achievement of treatment goals. The strength of using PSFS as an outcome measure and to monitor treatment progress at an individual level is that the PSFS is person-centered, in contrast to SPPB and EQ-5D where activities and questions are pre-specified and generic for all patients (31). Therefore, the use of PSFS in treatment planning and monitoring complements the use of other traditional generic or condition-specific questionnaires, and have the potential to capture relevant changes in older adults where the interventions are aimed at prevention, such as in the early intervention group.

Goal attainment

Although most patients either achieved or partially achieved their treatments goal, the proportion of patients having fully achieved the treatment goal was relatively low (44%) compared with other studies (5, 32). We can only speculate, but this can be due to different methods to assess goal attainment, too short follow-up period, accidents or unexpected medical worsening during follow-up, aspects related to the interventions (e.g. poor adherence to home exercise programs and too low frequency of physiotherapy follow-up), unrealistic goals, or lack of patient-centered goals, among others. When initiating physiotherapy, there is a potential to define better treatment goals that can lead to a higher proportion of patients reporting goal attainment. We found that reaching goals were associated with higher scores on PSFS and EQ-5D, but not SPPB. Others have also found poor associations between objectively measured physical performance and goal attainment (5), and between physical function and goal attainment (32). However, the former study included patients not necessarily seeking health care due to functional decline, while the latter study assessed physical function by a generic questionnaire. Further, due to more missing data on SPPB and thus lower power to detect an association between SPPB and goal attainment

compared to PSFS and EQ-5D, one should be cautious when interpreting the estimates of the SPPB from the regression analysis.

Conclusion

This observational longitudinal study is the first to describe the broad spectrum of patient characteristics receiving home based physiotherapy in primary health care in Norway. Older adults receiving early intervention had better mobility and health-related quality of life compared with those receiving reablement and regular physiotherapy. We found only minor differences in patient characteristics and treatment outcome between patients receiving reablement and those receiving regular physiotherapy. We have described a new target group (early intervention) for prevention of functional decline in older adults, contributing with new knowledge to decision makers in primary health care.

Abbreviations

CI – confidence interval

EQ-5D – EuroQol, five dimensions

FYSIOPRIM – physiotherapy in the primary health care

IQR – interquartile range

MCIC – minimum clinically important change

PSFS – patient specific functional scale

SD – standard deviation

SPPB – short physical performance battery

Declarations

Ethical approval and consent to participate

All participants gave written informed consent and the study was conducted according to the Helsinki declaration. Ethical approval was granted by the Regional committees for Medical and Health Research Ethics in Norway (REC no. 2013/2030).

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to permission has not been applied for from neither the participants nor the Ethical Committee, but might be available from the corresponding author on reasonable request.

Competing interests

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper. Financial support was obtained by the Norwegian Fund for Post-Graduate Training in Physiotherapy, Trondheim Municipality and the Norwegian University of Science and Technology.

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Author contributions

IM, KT, MG, SS, AEH, GM, and KAIE conceived and designed the study. IM and KAIE organised the data collection; KAIE was the principal investigator of the FYSIOPRIM project in Trondheim; IM performed data cleaning and processing of the FYSIOPRIM dataset; IM and JB analysed the data; IM, JB, KT, and KAIE drafted the manuscript; All authors contributed to the revision and editing of the final manuscript.

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References

1. UN. World Population Ageing 2017. New York: UN Department of Economic and Social Affairs; 2017.
2. Langeland E, Tuntland H, Folkestad B, Forland O, Jacobsen FF, Kjeklen I. A multicenter investigation of reablement in Norway: a clinical controlled trial. *BMC Geriatr*. 2019;19(1):29.
3. Sverdrup K, Bergh S, Selbæk G, Røen I, Kirkevold Ø, Tangen GG. Mobility and cognition at admission to the nursing home—a cross-sectional study. *BMC Geriatr*. 2018;18(1):30.
4. Bjerk M, Brovold T, Skelton DA, Liu-Ambrose T, Bergland A. Effects of a falls prevention exercise programme on health-related quality of life in older home care recipients: a randomised controlled trial.

5. Gell NM, Mroz TM, Patel KV. Rehabilitation Services Use and Patient-Reported Outcomes Among Older Adults in the United States. *Arch Phys Med Rehabil*. 2017;98(11):2221-7.e3.
6. Cochrane A, Furlong M, McGilloway S, Molloy DW, Stevenson M, Donnelly M. Time-limited home-care reablement services for maintaining and improving the functional independence of older adults. *The Cochrane database of systematic reviews*. 2016;10:Cd010825.
7. Aspinall F, Glasby J, Rostgaard T, Tuntland H, Westendorp RG. New horizons: Reablement - supporting older people towards independence. *Age Ageing*. 2016;45(5):572-6.
8. Lauretani F, Ticinesi A, Gionti L, Prati B, Nouvenne A, Tana C, et al. Short-Physical Performance Battery (SPPB) score is associated with falls in older outpatients. *Aging Clin Exp Res*. 2018.
9. Fusco O, Ferrini A, Santoro M, Lo Monaco MR, Gambassi G, Cesari M. Physical function and perceived quality of life in older persons. *Aging Clin Exp Res*. 2012;24(1):68-73.
10. Pavasini R, Guralnik J, Brown JC, di Bari M, Cesari M, Landi F, et al. Short Physical Performance Battery and all-cause mortality: systematic review and meta-analysis. *BMC Med*. 2016;14(1):215.
11. Middleton A, Fritz SL, Lusardi M. Walking speed: the functional vital sign. *Journal of aging and physical activity*. 2015;23(2):314-22.
12. Guralnik JM, Ferrucci L, Pieper CF, Leveille SG, Markides KS, Ostir GV, et al. Lower extremity function and subsequent disability: consistency across studies, predictive models, and value of gait speed alone compared with the short physical performance battery. *J Gerontol A Biol Sci Med Sci*. 2000;55(4):M221-31.
13. Vasunilashorn S, Coppin AK, Patel KV, Lauretani F, Ferrucci L, Bandinelli S, et al. Use of the Short Physical Performance Battery Score to predict loss of ability to walk 400 meters: analysis from the InCHIANTI study. *J Gerontol A Biol Sci Med Sci*. 2009;64(2):223-9.
14. Evensen KAI, Robinson HS, Meisingset I, Woodhouse A, Thielemann M, Bjorbaekmo WS, et al. Characteristics, course and outcome of patients receiving physiotherapy in primary health care in Norway: design of a longitudinal observational project. *BMC Health Serv Res*. 2018;18(1):936.
15. Sintonen H. The 15D instrument of health-related quality of life: properties and applications. *Ann Med*. 2001;33(5):328-36.
16. Perera S, Mody SH, Woodman RC, Studenski SA. Meaningful change and responsiveness in common physical performance measures in older adults. *J Am Geriatr Soc*. 2006;54(5):743-9.

17. Mathis RA, Taylor JD, Odom BH, Lairamore C. Reliability and Validity of the Patient-Specific Functional Scale in Community-Dwelling Older Adults. *J Geriatr Phys Ther.* 2018.
18. Nicholas P, Hefford C, Tumilty S. The use of the Patient-Specific Functional Scale to measure rehabilitative progress in a physiotherapy setting. *JManManipTher.* 2012;20(3):147-52.
19. Janssen MF, Pickard AS, Golicki D, Gudex C, Niewada M, Scalone L, et al. Measurement properties of the EQ-5D-5L compared to the EQ-5D-3L across eight patient groups: a multi-country study. *Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation.* 2013;22(7):1717-27.
20. Devlin NJ, Shah KK, Feng Y, Mulhern B, van Hout B. Valuing health-related quality of life: An EQ-5D-5L value set for England. *Health Econ.* 2018;27(1):7-22.
21. Walters SJ BJ. Comparison of the minimally important difference for two health state utility measures: EQ-5D and SF-6D. *Qual Life Res.* 2005;14(6):1523-32.
22. Tuntland H, Aaslund MK, Espehaug B, Forland O, Kjekken I. Reablement in community-dwelling older adults: a randomised controlled trial. *BMC Geriatr.* 2015;15:145.
23. Lewin G, De San Miguel K, Knuiman M, Alan J, Boldy D, Hendrie D, et al. A randomised controlled trial of the Home Independence Program, an Australian restorative home-care programme for older adults. *Health & social care in the community.* 2013;21(1):69-78.
24. Liu-Ambrose T, Donaldson MG, Ahamed Y, Graf P, Cook WL, Close J, et al. Otago home-based strength and balance retraining improves executive functioning in older fallers: a randomized controlled trial. *J Am Geriatr Soc.* 2008;56(10):1821-30.
25. Imanishi M, Tomohisa H, Higaki K. Impact of continuous in-home rehabilitation on quality of life and activities of daily living in elderly clients over 1 year. *Geriatrics & gerontology international.* 2017;17(11):1866-72.
26. Lusardi MM, Fritz S, Middleton A, Allison L, Wingood M, Phillips E, et al. Determining Risk of Falls in Community Dwelling Older Adults: A Systematic Review and Meta-analysis Using Posttest Probability. *J Geriatr Phys Ther.* 2017;40(1):1-36.
27. Guralnik JM, Simonsick EM, Ferrucci L, Glynn RJ, Berkman LF, Blazer DG, et al. A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol.* 1994;49(2):M85-94.
28. Arnetz JE, Almin I, Bergström K, Franzén Y, Nilsson H. Active patient involvement in the establishment of physical therapy goals: Effects on treatment outcome and quality of care. *Adv Physiother.* 2004;6(2):50-69.

29. Hazard RG, Spratt KF, McDonough CM, Carayannopoulos AG, Olson CM, Reeves V, et al. The impact of personal functional goal achievement on patient satisfaction with progress one year following completion of a functional restoration program for chronic disabling spinal disorders. *Spine (Phila Pa 1976)*. 2009;34(25):2797-802.
30. Stenstrom CH. Home exercise in rheumatoid arthritis functional class II: goal setting versus pain attention. *J Rheumatol*. 1994;21(4):627-34.
31. Jolles BM, Buchbinder R, Beaton DE. A study compared nine patient-specific indices for musculoskeletal disorders. *J Clin Epidemiol*. 2005;58(8):791-801.
32. Waldersen BW, Wolff JL, Roberts L, Bridges AE, Gitlin LN, Szanton SL. Functional Goals and Predictors of Their Attainment in Low-Income Community-Dwelling Older Adults. *Arch Phys Med Rehabil*. 2017;98(5):896-903.

Tables

Table 1. Demographical and clinical characteristics of adult and older patients receiving regular home based physiotherapy services in Trondheim Municipality (n=495). Values are reported as numbers and proportions, unless otherwise stated.

	Regular physiotherapy	
	n	%
Age		
median, IQR	82 (72-88)	
18-64	54	10.9
65-74	97	19.6
75-84	128	25.9
85-100	216	43.6
Sex		
Female	304	61.4
Male	191	38.6
Living condition		
Alone in own home	260	55.3
With others in own home	174	37.1
Institution	36	7.7
Body mass index, median (IQR)	23.7 (21.0-27.5)	
Education, ≤ high school	303	65.3
Number of falls within the last year		
0	147	32.7
1 to 2	183	40.0
≥ 3	127	27.8
Fear of falling		
Not at all worried	140	30.7
Slightly worried	137	30.0
Quite/very worried	179	39.2
Are you able to get up from the floor by yourself?		
No	235	50.8
Yes	166	35.9
Don` t know	62	13.4
Use of walking aid	389	83.1
Number of medications daily		
0	14	3.1
1-4	195	42.7
≥ 5	248	54.3
Non-smokers	400	85.7
Physical activity, frequency		
Inactive	214	46.4
1-3 times per week	124	26.9
Approx. every day	123	26.7
Sleep		
Normal sleep/slight problem	245	62.3
Moderate to severe problem	148	37.7
Vitality		
Energetic/slightly weary	154	35.2
Moderately/very/extremely weary	219	55.7

Pain intensity last week (NRS: 0 to 10), mean (SD)	3.5 (2.9)
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IQR=interquartile range, SD=standard deviation, NRS=Numeric Rating Scale, SBBP=Short Physical Performance Battery, PSFS=Patient Specific Functional Scale, EQ-5D=EuroQol health-related quality of life questionnaire.

^aThe denominator for the different variables is different due to missing data.

Table 2. Baseline scores and within group changes from baseline to post-treatment assessment in physical performance, physical function, and health-related quality of life in adult and older patients receiving home-based physiotherapy services in Trondheim Municipality.

	Total sample (n=689)	n	Regular physiotherapy (n=495)	n	Reablement (n=132)	n	Early Intervention (n=62)	n	Between group difference p-value ¹
Short Performance Physical Battery (0-12, higher score indicate better performance)									
Baseline, mean (SD)	6.2 (3.0)	389	5.5 (2.8)	216	5.5 (2.6)	113	7.9 (2.7)	60	<0.001
Post-treatment, mean (SD)	7.1 (2.7)	130	7.1 (2.5)	68	6.6 (2.7)	43	8.5 (2.7)	19	0.04
Change, mean (95% CI)	0.9 (0.6 to 1.1)	130	1.0 (0.6 to 1.4)	68	0.8 (0.4 to 1.3)	43	0.4 (-0.2 to 1.0)	19	0.31
MCIC ≥ 1 point, n (%)	66 (50.8)	130	35 (51.5)	68	24 (55.8)	43	7 (36.8)	19	0.38
Patient Specific Functional Scale (0-10, higher score indicate better function)									
Baseline, mean (SD)	3.6 (2.8)	497	3.2 (2.8)	364	4.1 (2.5)	90	4.1 (2.5) 4.6 (2.4)	43	0.11
Post-treatment, mean (SD)	6.0 (3.2)	249	5.9 (3.3)	185	5.8 (3.2)	33	6.4 (2.7)	31	0.71
Change, mean (95% CI)	2.3 (1.8 to 2.8)	249	2.5 (1.9 to 3.1)	185	1.8 (0.5 to 3.1)	33	1.7 (0.8 to 2.6)	31	0.36
MCIC ≥ 3 point, n (%)	102 (41.0)	249	81 (43.8)	185	10 (30.3)	33	11 (35.5)	31	0.28
Health related Quality of Life, EQ-5D (0-1, higher score indicate better quality of life)									
Baseline, mean (SD)	0.43 (0.23)	632	0.39 (0.23)	464	0.50 (0.15)	110	0.59 (0.19)	58	<0.001
Post-treatment, mean (SD)	0.54 (0.23)	303	0.51 (0.24)	218	0.59 (0.15)	43	0.62 (0.17)	42	0.003
Change, mean (95% CI)	0.10 (0.07 to 0.12)	303	0.11 (0.08 to 0.13)	218	0.10 (0.06 to 0.14)	43	0.04 (-0.01 to 0.09)	42	0.13
MCIC ≥ 0.08 point, n (%)	154 (50.8)	303	113 (51.8)	218	25 (58.1)	43	16 (38.1)	42	0.16

CI = confidence interval, EQ-5D=EuroQol health-related quality of life questionnaire, MCIC= Minimal clinically important change

¹ p-value from analysis of variance or chi-square test.

Table 3. Odds ratio with 95% confidence intervals as an estimate of the relative risk of having achieved the main treatment goal based on changes in physical performance, physical function and health-related quality of life between baseline and post-treatment assessment in adult and older patients receiving home-based physiotherapy services in Trondheim Municipality

	n total/cases	Crude OR	95% CI	p	Adj. OR^a	(95% CI)	p
Short Performance Physical Battery (0-12, per unit change)	116/60	1.24	(0.94 to 1.63)	0.13	1.26	(0.95 to 1.68)	0.11
Patient Specific Functional Scale (0-10, per unit change)	237/115	1.16	(1.08 to 1.25)	<0.001	1.18	(1.09 to 1.27)	<0.001
Health related Quality of Life, EQ- 5D (-2.825 to 1.0, per unit change=0.1)	285/138	1.17	(1.03 to 1.33)	0.02	1.24	(1.08 to 1.42)	0.002

^aAdjusted for sex, age, and group (regular physiotherapy, reablement, early intervention)
CI = confidence interval, p=p-value, adj=adjusted

Figures

Figure 1

These working models are organized to target different patient groups and purposes within the primary health care system, as depicted by their relationship with primary prevention and more specialized health care

Figure 2

Study flow chart