

Impact of functional rehabilitation on the functional status of long-term care patients: ICARE4OLD project results

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Introduction

Functional rehabilitation (FHR) is an important therapeutic approach aimed at improving the physical functioning of nursing home (NH) residents. It includes a variety of interventions, often implemented as part of a structured walking program, and is carried out by a licensed nurse to support or enhance a person’s ability to reach their maximum functional potential. Among older adults, especially those in institutional care, functional rehabilitation can play a crucial role in maintaining independence, reducing fall risk, and enhancing overall quality of life. Even small improvements in physical performance may lead to meaningful gains in daily functioning, greater participation in social activities, and decreased care needs over time.

Aim of the study

The aim of the study was to estimate the effects of FHR on reducing walking and locomotion problems among NH residents.

Methods

We analyzed data collected between 2005 and 2023 from routine assessments of patients in NHs using interRAI instruments version 9.0 and the Minimum Data Set 2.0. These tools include 200 to 400 standardized variables covering clinical, functional, medical, and psychosocial domains.

We defined the treatment group as patients who received functional rehabilitation at two time points between day 80 and day 200, including at least 15 minutes of therapy in the week prior to the baseline assessment. The control group included individuals who did not receive any therapy at baseline or during the follow-up period.

The analysis included data from the Netherlands (n = 41,610) and Belgium (n = 34,832).

We conducted logistic regression analyses to assess the effect of functional rehabilitation on reducing the occurrence of walking and locomotion problems over the last three days. The main result of our analysis is the Average Treatment Effect (ATE). ATE values below 0 indicate a beneficial effect of FHR in improving walking and locomotion, while values above 0 suggest a negative effect.

We assessed model performance using the receiver operating characteristic (ROC) curve and classification accuracy (ACC). We applied propensity score matching to pair each treated individual with a comparable control based on observed characteristics. We divided the dataset into a training subset (70%) and a testing subset (30%) for model evaluation.

Results

Table 1. Basic characteristics of the **training data set** used in the analysis of walking on the same floor, after propensity score matching

| Characteristic | Treatment group (n=103) | Control group (n=103) |
|--------------------------------|-------------------------|-----------------------|
| Walking on the same floor, yes | 86 (83%) | 86 (83%) |
| Gender, female | 74 (71%) | 75 (73%) |
| Age | | |
| 60-79 | 18 (17%) | 20 (19%) |
| 80-89 | 52 (51%) | 47 (46%) |
| 90 and more | 33 (32%) | 36 (35%) |
| CPS mean | 2.21 | 2.16 |
| ADL mean | 6.62 | 5.68 |
| Dizziness, yes | 29 (28%) | 25 (24%) |
| Unsteady gait, yes | 72 (70%) | 57 (55%) |
| Foot problems, yes | 21 (20%) | 21 (20%) |

Table 2. The effect of functional rehabilitation on the occurrence of problems with walking and locomotion on the same floor, training data set

| Outcome | Time of observation (a) and intensity of PT (b) | n | ATE (95%CI) | ROC | ACC |
|------------------------------|---|-----|------------------------|----------------------------------|----------------------------------|
| Walking on the same floor | (a) 80-200 days (b) 15 minutes of FHR in last week | 206 | -0.09 [-0.17 to -0.01] | Control: 0.82 Treatment: 0.86 | Control: 0.80 Treatment: 0.80 |
| Locomotion on the same floor | (a) 80-200 days (b) 15 minutes of FHR in last week | 220 | -0.08 [-0.16 to -0.01] | Control: 0.77 Treatment: 0.85 | Control: 0.88 Treatment: 0.80 |

Table 1 presents the characteristics of the training data set. The variables shown in the table were used in the logistic regression model. Overall, both the treatment and control groups were very similar. The most significant difference can be observed in the case of unsteady gait, which occurs more frequently in the treatment group than in the control group (70% vs. 55%).

Logistic regression analysis showed that FHR had a positive effect on reducing walking and locomotion problems. For walking problems, we observed a 9% reduction in the occurrence of these issues in the treatment group (95% CI from -0.17 to -0.01). For locomotion problems, the ATE was -0.08 (95% CI from -0.16 to -0.01).

Model fit was acceptable for both walking and locomotion problems, with ROC and ACC values above 0.7 (see Table 2 and Figures 1 and 2).

Figure 1. The effect of functional rehabilitation on the occurrence of walking difficulties on the same floor, training dataset (n = 206)

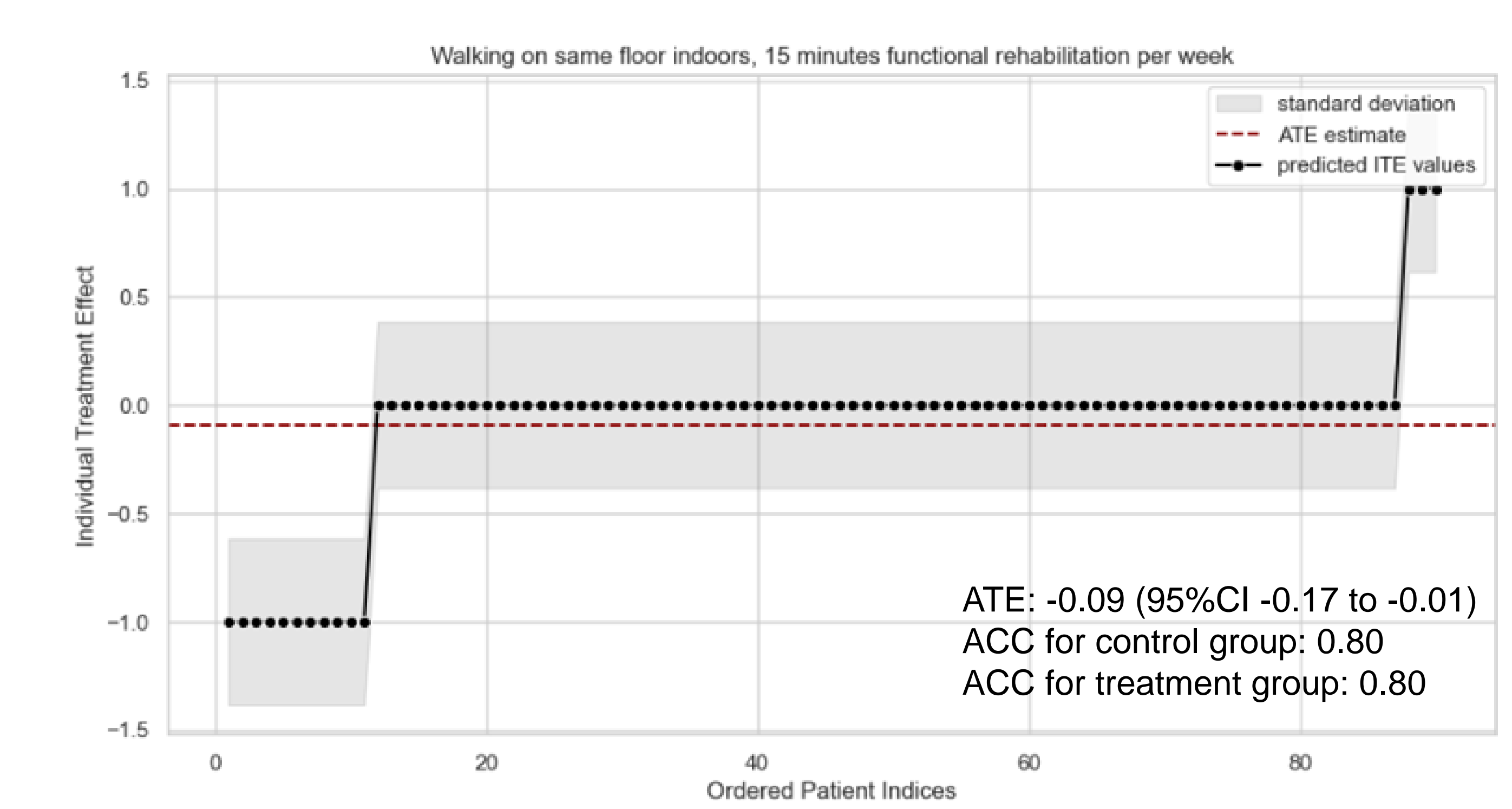
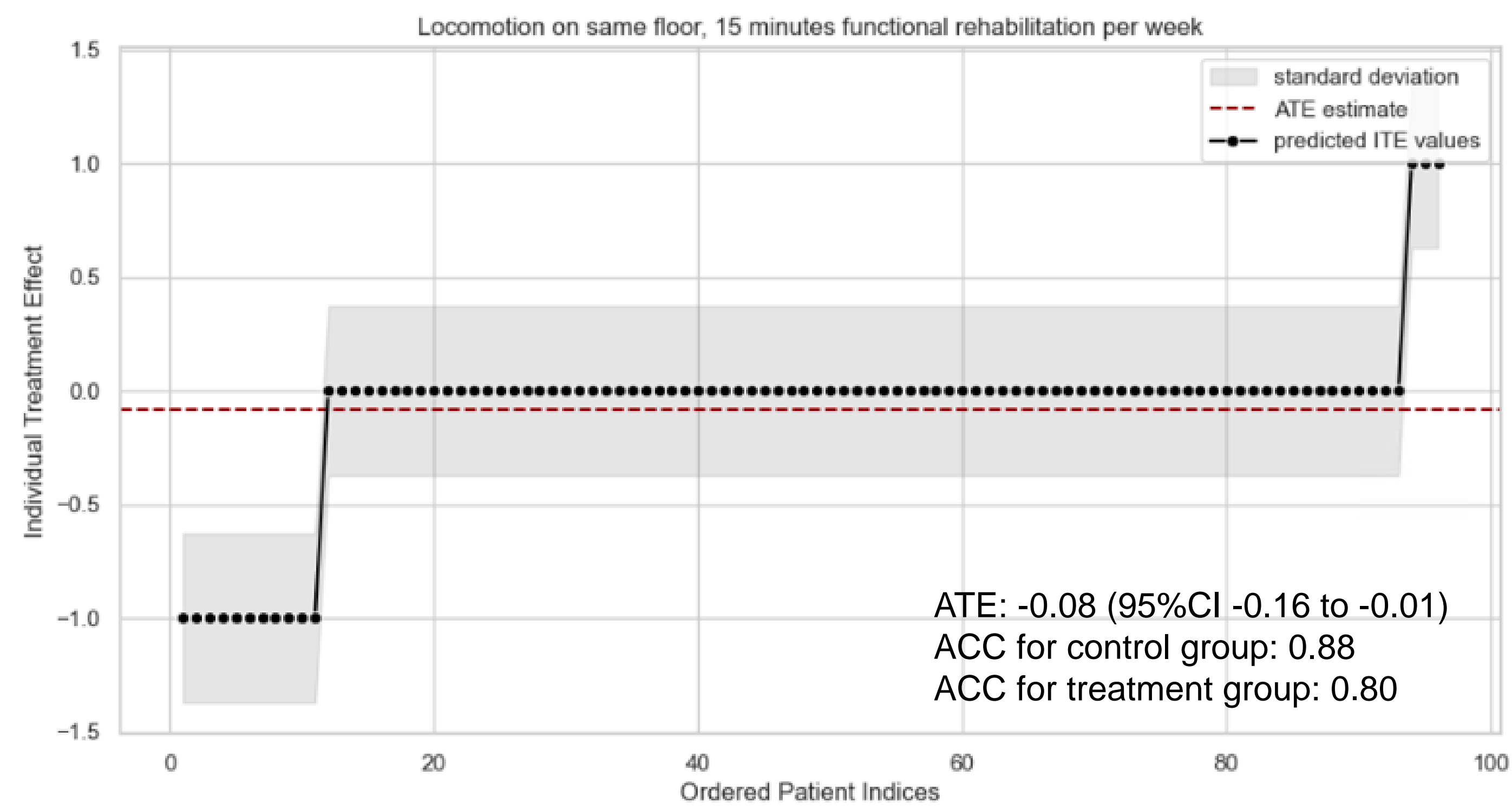


Figure 2. The effect of functional rehabilitation on the occurrence of locomotion problems, training data set (n=220)



Conclusions

Our analysis suggests that functional rehabilitation may have a positive effect on reducing problems related to walking and mobility among nursing home residents—even when the therapy is limited to as little as 15 minutes per week. These findings may support healthcare professionals in making informed decisions about prescribing functional rehabilitation for older adults in institutional care. It may also differ. Therefore, its effectiveness should be considered in the context of the specific country.



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