ORIGINAL ARTICLE

Assessing Physical Activity in Inpatient Rehabilitation: Validity, Practicality, and Sensitivity to Change in the Physical Activity in Inpatient Rehabilitation Assessment

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ABSTRACT. Denkinger MD, Lindemann U, Nicolai S, Igl W, Jamour M, Nikolaus T. Assessing physical activity in inpatient rehabilitation: validity, practicality, and sensitivity to change in the Physical Activity in Inpatient Rehabilitation Assessment. Arch Phys Med Rehabil 2011;92:2012-7.

Objective: To validate a novel assessment of inpatient physical activity.

Design: Prospective cohort study for the evaluation of a novel questionnaire for physical activity in geriatric inpatients.

Setting: German geriatric inpatient rehabilitation unit.

Participants: Patients (N=96; 67 [72%] women; median age, 81y) with a variety of main underlying diagnoses, including musculoskeletal diseases, hip fracture, cardiovascular diseases, stroke, and others.

Interventions: Not applicable.

Main Outcome Measures: Ceiling and floor effects and administration time were measured. For criterion-related concurrent validity (convergent and discriminative), the Physical Activity in Inpatient Rehabilitation Assessment (PAIR) was administered in parallel to self-rated, proxy-rated, and performance-based measures of physical function at admission. Measurements were repeated at discharge and 4-month follow-up in the home environment, including a standard physical activity questionnaire to determine predictive validity. Spearman correlation coefficients were calculated to describe associations between parameters. Sensitivity to change was estimated using standardized response means (SRMs).

Results: Administration time of the PAIR ranged from less than 1 to 4 minutes. Ceiling effects occurred mainly at discharge (5%–14%), and floor effects (5%–11%), at admission. There were no missing values. Associations between convergent and predictive validity measures and functional measures (r=.43–.53, r=.49–.54, respectively) were clearly better when cognition was intact. Discriminative validity expressed as effect sizes ranged from .27 to 1.44. The SRM to describe sensitivity to change was .65 for the total score.

Conclusions: The PAIR is the first validated questionnaire to assess physical activity in geriatric inpatients. It is practical and its validity and sensitivity to change are similar to existing physical activity questionnaires for community-dwelling older persons.

Key Words: Assessment; Inpatient rehabilitation; Physical activity; Psychometric properties; Rehabilitation.

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REDUCED PHYSICAL ACTIVITY is an important risk factor for functional decline and disability and has been used as an indicator of physical frailty.[1,2] In inpatient geriatric clinics, many outcomes have been defined without considering physical activity. Although several assessments exist for the community-dwelling elderly, there is no assessment for inpatients.[3] Nevertheless, physical activity continues to be in the focus of current research activities across all age groups, and investigators have used proxies from available interview-based instruments to determine physical activity in inpatients.[4] These proxies usually represent function-based assessments and hence mix 2 distinct concepts. We recently criticized this practice.[5] To calculate frailty scores that involve physical activity, a physical activity assessment is preferred to another assessment of lower-extremity function. Therefore, a novel assessment for physical activity in inpatient geriatric rehabilitation was introduced, the Physical Activity in Inpatient Rehabilitation Assessment (PAIR), as shown in figure 1. The interview can be started with the least difficult task, stepwise going toward the most difficult task, or vice versa. If the patient does not fill out the assessment on his/her own, the questions should be asked as follows: "Between therapy sessions, were you mostly lying in bed in order to recover" and so on. Regardless of the answer, continue to the next task because patients might sit and lay down a great amount of the time and would answer yes to both questions. Please always continue to the most difficult task if the patient's mobility is good enough to theoretically undertake walks on his/her own. Be careful not to

List of Abbreviations

BAS	Brief Alzheimer Scale
BI	Barthel Index
IRIE	Inpatient Rehabilitation in Ehingen (study)
PAIR	Physical Activity in Inpatient Rehabilitation Assessment
PASE	Physical Activity Scale for the Elderly
SF-LLFDI	Short Form-Late Life Function and Disability Index
SPPB	Short Physical Performance Battery
SRM	standardized response mean

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Between therapy sessions….	To what extent	Score
1. …I was mostly lying in bed in order to recover	Yes	0
2. …I was mostly sitting in my room in order to recover	Yes	1
3. …I was undertaking little walks on the ward	Yes sometimes	2
	Yes often	3
4. …I was undertaking little walks outside the ward (i.e. cafeteria)	Yes sometimes	4
	Yes often	5
5. … I was undertaking little walks outside the hospital	Yes sometimes	6
	Yes, often	7

Fig 1. The PAIR assessment.

underestimate the patient's physical activity. The definition of sometimes and often is as follows: "yes, sometimes" should be scored if the task has been accomplished fewer than 4 times a week. "Yes, often" can be scored when the patient has done the task 4 or more times a week. Severely cognitively impaired elderly might be assessed by using proxies (ie, relatives or nurses, if applicable). Please note that what the patient has done during therapy sessions is irrelevant. Instead, the questionnaire aims to assess physical activity even in the context of participation with relatives. Wheelchair use (not validated): what should be scored if a patient is being pushed along the ward or even outside the hospital in a wheelchair, but is not able to leave the bed without assistance? Because the PAIR has not been developed as an assessment of physical function, we believe the activity and not the functional capabilities (even with the assistance of relatives or visitors) should be scored. However, if the patient was urged to go outside and he/she was absolutely passive during the walk, we would not regard this activity as physical activity in the sense of the International Classification of Functioning, Disability and Health. Further studies are needed to clarify this issue. The final score of the PAIR is the maximum score, not a cumulative score. For example, if the patient manages to undertake little walks on the ward every day but during the rest of the time sits in his/her chair, he/she would score 4 points. In preliminary analyses, the PAIR was practical, short, and easy to use in patients with a wide range of cognitive capabilities.[5]

Although mobility has been the main focus of geriatric rehabilitation units to date, physical activity has always been seen in the context of participation and therefore in the context of a community environment. This could be 1 of the reasons why there is no validated assessment of inpatient physical activity to date. However, physical activity has proved to be a significant predictor of diverse health outcomes in the community-dwelling population.[6,7] For that reason, inpatient physical activity also could be used as an important predictive factor. Additionally, physical activity in hospitals could include participation (ie, through motivation to get out of bed or walk outside the ward) and therefore reflect or even predict physical activity at home. Although an acute adverse health event and consecutive hospital stay surely alter physical activity, patients' attitudes toward it could prevail. It was hypothesized that patients who are active in the inpatient setting also will be more active back home.

Looking at physical activity assessments throughout the literature, most activity items are related to the lower extremity or at least include lower-extremity activities.[8] Many of them have been validated by using pedometers. A new study that compared 3 different assessments that used pedometers, hand-worn activity sensors, and "doubly labelled water" as a standard measurement found that pedometers were most accurate to give a "real" estimation of physical activity.[9] In addition, our population (and many other geriatric inpatients) were mostly orthogeriatric. In this patient group, physical activity is expressed mostly by walking.[10,11] Focusing on practicality, we therefore decided to use the range of mobility (which mostly involves ambulation) when developing the PAIR.

The objective of this study was to perform a comprehensive validation of the PAIR in inpatients. In this article, data for several types of criterion-related validity (convergent, predictive, concurrent, discriminative) of the PAIR and its sensitivity to change and practicality are presented.

METHODS

Participants and Design

Population. Hospitalized men and women (N=96) from the Inpatient Rehabilitation in Ehingen (IRIE) Study[12] were recruited in a German geriatric rehabilitation clinic. The considerably lower number of patients enrolled in this analysis is due to development of the assessment during the first phase of the study. Patients were 65 years and older and able to walk at baseline with or without walking aids. They were assessed at admission, 3 weeks later in the hospital (mostly at discharge), and 4 months later at a follow-up in the home environment. Fifty-six patients also were rated by the nursing staff 3 days after admission and before discharge. Twenty of 96 (21%) patients who participated in the baseline examination were lost to follow-up. Reasons for loss to follow-up were withdrawal (n=13), death (n=2), institutionalization (n=2), and relocation (n=3). Reasons for withdrawal were exhaustion (n=11) because of the long (>60min) and frequent assessments (at admission, week 1, week 2, at discharge, at home). Two participants did not comment on the reasons. Further details for

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