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Original article

Selecting, assessing and interpreting measures of function for patients with severe hip pathology: The need for caution

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ABSTRACT

Introduction: It is not always possible to use a combination of patient-reported outcome measures (PROMs), performance tests and clinician-administrated measures to assess physical function prior to hip surgery. We hypothesised that there would be low correlations between these three types of measure and that they would be associated with different patients' characteristics.
Materials and methods: We conducted a cross-sectional analysis of the preoperative information of 125 participants listed for hip replacement. The WOMAC-function subscale, Harris Hip Score (HHS) and walk, step and balance tests were assessed by questionnaire or during a clinic visit. Participant's socio-demographics and medical characteristics were also collected. Correlations between functional measures were investigated with correlation coefficients. Regression models were used to test the association between the patient's characteristics and each of the three types of functional measures.
Results: None of the correlations between the PROM, clinician-administrated measure and performance tests were very high (< 0.90). Associations between patient's characteristics and functional scores varied by type of measure. Psychological status was associated with the PROM (*P*-value < 0.0001) but not with the other measures. Age was associated with the performance test measures (*P*-value ranging from ≤ 0.01 to < 0.0001) but not with the PROM. The clinician-administered measure was not associated with age or psychological status.
Discussion: Substantial discrepancies exist when assessing hip function using a PROM, functional test or a clinician-administered test. Moreover, these assessment methods are influenced differently by patient's characteristics. Clinicians should supplement their pre-surgery assessment of function with patient-reported measure to include the patient's perspective.
Level of evidence: III, observational cross-sectional study.

1. Introduction

Physical functioning in patients undergoing hip surgery is commonly assessed in three ways [1]: patient-reported outcome measure (PROM), performance test, or clinician-administered measure. It is recommended that several types of measures are used concurrently to capture an extended picture of function [2,3] and ideally patient-reported symptoms and surgeon's assessment must fit together before deciding on operating. Patient fatigue and burden, time, resources and logistical constraints of clinic and research appointments mean that collecting multiple measures is seldom feasible, leading to focus on a limited number of measures, if not a single one.

The standardised nature of performance tests and clinician-administered measures confer some objectivity, but they are resource intensive and may not assess the functional limitations experienced during the activities of daily living of relevance to patients [4,5]. PROMs are easier to use, put patient's perspectives at the centre of the assessment and can take into account environmental or behavioural adaptations, but are subjective [4].

Performance tests tend to only describe activity limitations, while PROMs and clinician-administered measures also focus on impairment [1,6].

It is also unclear if these measures have similar relationships with the characteristics of patients. These characteristics can influence the actual level of functional ability and how function is perceived and reported [3,7–10]: for example, obesity and bone structure can affect the accuracy of clinical measures [11], and age and vulnerability can influence communication with interviewers [12].

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We hypothesised that functional limitations evaluated prior to hip surgery with only one outcome measure would provide a biased assessment of function. While there is evidence that performance tests and PROMs do not fully correlate [13–16], correlations between PROMs, performance tests and clinician-administrated measures are yet to be evaluated. Furthermore, it is also not known if the associations between function and patients' characteristics depend on how function is measured.

The aim of our study was to use different measures to assess function in the same group of patients before their hip surgery to determine how well PROMs, performance tests and clinician-administrated measures correlate with one another and whether these measures are associated with the same patient's characteristics.

2. Methods

The data are from a prospective single-centre cohort study including patients undergoing hip replacement (primary or revision). Detailed information on study design, ethical approval, patient recruitment and consent, and assessment methods are in the study protocol [1] (participants listed for a knee replacement were not included in this analysis). Participants were sent a pre-operative questionnaire about their characteristics and functional limitation and were then invited to an appointment during which performance tests and clinician-administered measure were completed.

2.1. Functional measures

The clinician-administered functional test was the Harris Hip Score (HHS) [17]. The PROM was the function component of the WOMAC score [18]. The performance tests were a timed 20-metre walk (meters/second), step (ability to climb a 30-cm high block), and single stance balance (ability to stand balance for 15 seconds) tests.

2.2. Patients' characteristics and pain

Participants provided data about their age, gender, living arrangements, level of education and working status. Co-morbidities were collected with the Functional Co-morbidity Index (FCI) [19]. Psychological distress was assessed with the Hospital Anxiety and Depression Scale (distress defined as having a score > 10 on either of the anxiety and depression subscales or a combined score of ≥ 15 with a score of at least eight on each of the two subscales) [20]. Arthritis severity was derived as a count of affected joints other than the joint listed for surgery. Information on body mass index and type of surgery were extracted from medical records. Pain was self-reported with the pain component of the WOMAC score [18].

2.3. Statistical analyses

The relationships between the different types of functional measure were assessed with Spearman rank (for correlations between continuous variables) or point-biserial (for correlations between continuous and dichotomous variables) coefficients. The strength of correlation was considered high from |0.70| to |0.89| and very high from |0.90| to |1.00| [21].

Table 1
Participants' characteristics (n = 125).

	n	%
Surgery type		
Primary replacement	81	64.8
Revision surgery	44	35.2
Age (year)		
Median (25th–75th)	125	64.4 (57.1, 72.5)
Gender		
Female	63	50.4
WOMAC pain[a]		
Mean (95% CI)	124	53.9 (50.0, 57.8)
Missing	1	
Psychological distress[b]		
Yes	40	32.0
BMI (kg/m²)		
Median (Q1–Q3)	125	26.9 (24.2, 30.3)
Overweight	51	40.8
Obese	33	26.4
Functional Co-Morbidity Index		
None	56	46.0
1 co-morbidity	44	35.9
≥ 2 co-morbidities	21	18.1
Missing	4	
Arthritis		
0 joint	26	21.7
1 joint	30	25.0
2 joints	23	19.4
3 joints	18	15.1
≥ 4 joints	22	18.8
Missing	6	
Living alone		
Yes	30	24.6
Missing	2	
Education		
Normal leaving school age or before	67	54.2
College	28	22.6
University	28	22.9
Missing	2	
Working status		
Paid or volunteer activity	58	46.4
Retired	60	48.0
Unemployed	7	5.6

Category/variable sample sizes (n) are derived from the overall sample to highlight the extent of missing data. Summary statistics are derived from 10 imputed datasets to account for those missing information.

[a] Range: 0–100, worst to best.

[b] Hospital Anxiety and Depression Scale.

Table 2
Functional measures (n = 125).

	Mean	SD[a]	Min	Max
Patient-reported outcome measure				
WOMAC-function[b]	55.3	22.0	0.0	100.0
Clinician-administered measure				
Harris Hip Score[b]	54.0	17.5	23.2	97.0
Performance tests				
Walking speed[c] (m/s)	0.9	0.4	0.2	1.7
Stepped 30 cm-achievement	60.4%			
Balance test-achievement	46.6%			

[a] Standard deviation.

[b] Range: 0–100, worst to best.

[c] Median and interquartile range reported instead of mean and standard deviation.

Table 3
Correlation coefficients[a] between functional measures (n = 125).

	Harris Hip Score	P-value	WOMAC-function	P-value
WOMAC-function	0.71	< 0.0001		
Walking speed	0.67	< 0.0001	0.56	< 0.0001
30 cm-step	0.48	0.0001	0.37	0.0001
Balance	0.38	0.0001	0.27	0.0020

[a] Spearman rank correlation coefficients except those involving the 30 cm-step and balance tests which are point-biserial correlation coefficients. Range: −1 to +1. Strength of correlation: |0.00|–|0.29|: none-little; |0.30|–|0.49|: low; |0.50|–|0.69|: moderate; |0.70|–|0.89|: high; |0.90|–|1.00|: very high.