Prosthetic Limb Users Survey of Mobility (PLUS-M): Reference Guide

Outcomes Committee Resource created by Barber Prosthetics Clinic: Malena Rapaport (BKin, MSc) and Rachel Bader (BSc)

Introduction

The PLUS-M is a patient reported outcome measure designed to assess mobility in adults with lower extremity amputations[1]. Questions cover a wide range of activities and patients report on their perceived ability to perform each activity[1].

Establishing author: Brian J. Hafner, PhD

Data Type: Ordinal

Measurement Type: Patient-reported

Assessment Type:

Required Resources

Time: 2-3 minutes

Personnel: 1 person

Equipment: clipboard and pen or electronic device for online versions

Space: no additional space required

Cost: free

Test Administration

The PLUS-M is available in three different formats: a 12-item short form, 7-item short form and a computerized adaptive test (CAT) format[1]. The 12-item short form and the 7-item short forms can be administered both by paper or electronically. The CAT is electronic and automatically scored. The 12-item short form and CAT offer the highest measurement precision.

1. Brief the patient to answer questions based on their perceived ability to carry out each specified activity.
2. Hand clipboard and pen or tablet/computer to patient to begin completing survey
3. Once completed, verify patient has answered at least 4 questions on the 7-item short form and at least 6 questions on the 12-item short form
4. Add up score from all answered questions to obtain raw score
5. Refer to T-Score Conversion Table to find T-Score associated with raw score

Psychometric Properties

Psychometric testing is available for adult individuals with lower extremity amputations who have experience using a prosthesis[1].

Outcome measure	Reliability			Validity	Responsiveness		Normative Data
	Test-Retest	**Inter-rater**	**Intra-rater**		**MDC**	Floor/Ceiling Effect	
PLUS-M	yes	no	no	yes	yes	yes	
BBS	yes	yes	yes	yes	yes	yes	yes

Reliability. Excellent test-retest reliability has been established for the PLUS-M with intraclass correlation coefficients (ICC) values greater than 0.9 indicating they are appropriate for making clinical decisions at an individual level[2].

Validity. The PLUS-M has adequate convergent construct validity as it was found to have positive relationship with Amputee Mobility Predictor (AMP) (p=0.54), Prosthesis Evaluation Questionnaire-Mobility Subscale (PEQ-MS) (p=0.78), Activity Balance Scale (ABC) (p=0.81) and Patient-Reported Outcomes Measurement Information System-Physical Function (PROMIS-PF) (p=0.81) and a negative relationship with the Timed Up and Go (TUG) (p=-0.56)[3]. Known-groups construct validity was established by evaluation of participants within Medicare Functional Classification Level (MCFL) groups[3]. Content validity was established through cognitive interviews for development of questions in item bank[4].

Responsiveness. Minimal detectable change (MDC) with a 90% confidence interval was found to be 5.36, 5.39 and 7.65 for 12-item short form, 7-item short form, and the CAT respectively[2]. No floor or ceiling effects were found[2 3].

Interpretation

Measure	ICC	MDC (90)	MDC(95)
PLUS-M[2]			
CAT	**0.92**	**6.42**	**7.65**
7-Item Short Form	**0.95**	**4.69**	**5.39**
12-Item Short Form	**0.96**	**4.50**	**5.36**

The purpose of the T-score is to provide a standardized score based on a normal distribution curve where the mean score is 50 and the standard deviation (SD) is 10[1]. Therefore, the higher the T-score, the greater the level of mobility. For each T-score, the associated percentile can be interpreted as the percentage of the population that scored a lower mobility score[1]. This data is also available as subsets of the population as seen below in the table.

Unilateral lower extremity amputation[1] PLUS-M T-score	Median Score	SD	Min-Max Score
Total population	50.0	10	17.5-76.6
Transfemoral Dysvascular	42.6	9.0	17.5-67.0
Male	44.6	8.4	24.1-67.0
Female	39.6	9.9	17.5-62.8
Under 35 years old	50.7	9.2	46.3-67.0
36-50 years old	47.8	8.6	37.4-62.8
50-65 years old	40.2	8.2	17.5-60.3
>65 years old	42.8	8.9	24.1-63.7
Transfemoral Trauma	50.1	8.1	25.7-76.6
Male	50.9	8.1	25.7-76.6
Female	48.6	7.7	33.6-68.5
Under 35 years old	52.9	7.4	38.4-76.6
36-50 years old	49.9	9.0	33.3-71.0
50-65 years old	50.0	8.2	25.7-68.5
>65 years old	49.5	5.9	33.0-62.8
Transtibial Dysvascular	47.2	8.9	21.9-73.6
Male	48.0	8.7	21.9-73.6
Female	43.7	8.6	24.5-73.2
Under 35 years old	44.9	12.9	42.2-73.5
36-50 years old	51.2	9.4	22.1-71.3
50-65 years old	40.2	8.8	25.4-73.6
>65 years old	44.6	8.0	21.9-66.4
Transtibial Trauma	55.4	9.3	31.8-76.6
Male	57.0	9.3	31.8-76.6
Female	53.8	8.4	35.4-76.6
Under 35 years old	58.1	10.0	36.1-76.6
36-50 years old	55.2	9.2	34.6-76.6
50-65 years old	55.1	8.8	31.8-76.6
>65 years old	54.9	9.6	33.9-76.6

Limitations

The PLUS-M can be used on individuals with both unilateral and bilateral lower extremity amputations, however it is important to note that PLUS-M T-Scores are based off a population of individuals with a unilateral, lower extremity amputation only[1]. The CAT or 12-item short form are recommended for use when clinical decisions regarding mobility are to be made, whereas although the 7-item short form does off measurement precision, it is best suited to monitor patient health over time rather than to make clinical decisions[1].

Documentation in Clinical Notes

Example: Today the patient scored a T-score of 56.3 on the PLUS-M 12-item short form. This is a decrease of 4.3 points since they were last assessed one month ago. This change in score is less than the MDC for the 12-item Short Form, therefore the patient did not change in their perceived mobility. When compared to the normative data for the PLUS-M population sample, the patient's score is higher than other patients with unilateral transtibial amputations due to dysvascular disease.

Acknowledgement: This document format was adapted from material published by The Australian Orthotic and Prosthetic Association, Inc.

Disclaimer: The authors, Outcomes Research Committee, and the American Academy of Orthotists and Prosthetists recommend use of outcome measures in routine clinical practice. Selection of specific outcome measures should be based on the patient, setting, and application. No recommendation of any particular outcome measure over another is made of implied. The authors declare no conflict of interest in the presentation of this measure.

References

1. Prosthetic Limb Users Survey of Mobility (PLUS-M™) Version 1.0 Short Forms Users Guide. 2014. http://www.plus-m.org. Accessed on June 6, 2017.
2. Hafner B, Morgan S, Askew R & Salem R. Psychometric evaluation of self-report outcome measures for prosthetic applications. *JRRD.* 2016;53(6),797-812.
3. Hafner B, Gaunaurd I, Morgan S, Amtmann D, Salem R & Gailey R. Construct validity of the Prosthetic Limb Users Survey of Mobility (PLUS-M) in adults with lower limb amputation. *Archives of Physical Medicine and Rehabilitation.* 2017;98(2),277-285.
4. Morgan S, Amtmann D, Abrahamson D, Kajlich A & Hafner B. Use of cognitive interviews in the development of the PLUS-M item bank. *Qual Life Res.* 2014;23(6),1767-1775.