2 Minute Walk Test for Adults with Lower-Limb Amputations

Description: The 2 Minute Walk Test (2MWT) can be used as a functional outcome measure,[1] particularly when individuals are unable to ambulate for 6 minutes.[2] In community-dwelling adults with lower-limb amputations who are using a prosthesis, 2MWT distance is significantly related to steps taken per day as assessed with research-grade accelerometers.[5]

Equipment: Stopwatch, rolling tape measure, long hallway[3,4] or loop walkway, vital sign equipment, assistive device prn

Patient Instructions: "This test assesses your walking capacity. Cover as much ground as possible in 2 minutes. While I want you to walk as fast possible, I want you to do so safely. You may rest at any point[2] but the clock will not stop so please start walking again as soon as you are able. To avoid limiting your speed, we will refrain from conversation. I will give you time updates. [I will walk with you (if loop walkway or safety concerns)]. Begin."

Clinician Instructions: Assess vital signs pre- and post-2MWT. Time the subject for 2 minutes, then say "stop." Measure the distance walked. If repeating the test, use the same course as the baseline test as the number of turns may affect the distance walked.[5] **Do not perform if: systolic BP >180mmHg, diastolic BP>100mmHg, OR resting heart rate >120bpm.[6]**

Procedure[3]:

Do	Do NOT
Walk behind the patient if using loop walkway	Pace the patient if using a loop walkway (i.e. walk on their side)
Provide standardized encouragement every 30 seconds (i.e. "you're doing great" or "you're doing fine" or "keep going") and notify patient of time remaining every minute (i.e. "1 minute remaining")	Converse with the patient other than to give standard encouragement, give time checkpoints, and to check symptom status.
Utilize a standard tone of voice	Use an excited tone as to "cheer" the patient on
Roll measurement wheel along the patient's path & stop where he/she stops	Roll the measurement wheel too close to the patient in case they stop suddenly

STOP testing based on the following criteria:
1. Angina symptoms (chest pain or tightness)
2. Any of the following symptoms:
   - Light-headedness
   - Confusion
   - Ataxia, staggering unsteadiness
   - Pallor
   - Cyanosis
   - Nausea
   - Marked dyspnea
   - Unusual fatigue
   - Signs of peripheral circulatory insufficiency
   - Claudication or other significant pain
   - Facial expressions signifying distress
3. Abnormal cardiac responses
   - Systolic BP drops > 10 mmHg
   - Systolic BP rises to > 250 mmHg
   - Diastolic BP rises to > 120 mmHg
   - Heart rate drops more than 15 bpm (given patient was walking the last minute of the test)

Notify physician if test terminated for above reasons.

Convergent Validity (i.e. Highly Predictive of 6MWT; R^2=.91)[3]
 Equation: 6MWT (m) =3.14 (2MWT in m)-54.5
 Equation has best predictive ability in higher-level ambulators (i.e. K3/4)
Discriminant Validity[3]
 ≥113 m = K3/4 (community-level ambulation potential)
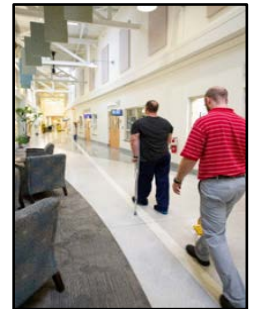**Test-Retest Reliability:** ICC (95% CI): .83 (.72-.90)
Standard Error of Measurement[4]: 15 m[4]
**Minimal Detectable Change (at 90%)[4]:** 34 m (112 feet)
Responsive to change[2]
No ceiling effect in prosthetic users with a unilateral amputation[7]
↑ age & higher amputation level associated with ↓ distance walked[1]

COURSE LAYOUT EXAMPLES

20 yards

100 feet (30 meters)

Population-Specific Reference Values	Age (y)	Distance (m)
Acutely Post-Amputation with Prosthesis at Start of Inpatient Rehabilitation (Unilateral Transtibial/Transfemoral; Bilateral)[2]	64-69 ± 11-14	Male: 30±19; Female: 22±12
Acutely Post-Amputation with Prosthesis at Discharge from Inpatient Rehabilitation (Unilateral Transtibial/Transfemoral; Bilateral)[2]	64-69 ± 11-14	Male: 46±31; Female: 29±14
3 Months Post-Discharge from Inpatient Rehabilitation (Unilateral Transtibial/Transfemoral; Bilateral)[2]	64-69 ± 11-14	Male: 81±47; Female: 50±27
Long-Term Prosthetic Users with Unilateral Transtibial or Transfemoral (n=46) or Bilateral Transtibial Amputation (n=6); majority vascular/trauma etiology[8]	50±9	11±49
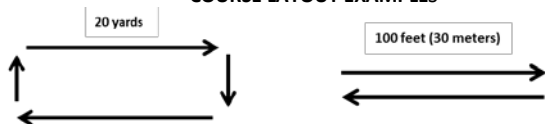
Normative Data for 6 Minute Walk Test for Able-Bodied Adults [Mean (95% CI)][9]

18-54 y (n=799)		55-59 y (n=53)		60-64 y (n=77)		65-69 y (n=44)		70-74 y (n=65)		75-79 y (n=33)		80-85 y (n=66)	
Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
200m (197-204)	183m (180-185)	191m (176-205)	176m (168-184)	179m (165-192)	166m (158-174)	184m (170-197)	155m (140-169)	172m (163-180)	145m (136-154)	157m (140-174)	140m (121-159)	144m (132-155)	134m (125-142)

[1] Frian-Vrgoc L, et al. Functional outcome assessment of lower limb amputees and prosthetic users with a 2-minute walk test. *Coll Antropol*. 2011;35:1215-1218. [2] Brooks D, et al. The 2-minute walk test as a measure of functional improvement in persons with lower limb amputation. *Arch Phys Med Rehabil*. 2001;82:1478-1483. [3] Reid L, et al. Going places: does the two-minute walk test predict the six-minute walk test in lower extremity amputees? *J Rehabil Med*. 2015;47:1977-1916. [4] Resnik L, et al. Reliability of outcome measures for people with lower-limb amputations: distinguishing true change from statistical error. *Phys Ther*. 2011;91:555-565. [5] Orendurff MS, et al. The kinematics and kinetics of turning: limb asymmetries associated with walking a circular path. *Gait Posture*. 2006;23:106-111. [6] American Thoracic Society. ATS statement: guidelines for the six-minute walk test. 2002. Available at: https://www.thoracic.org/statements/resources/pfet/sixminute.pdf. [7] Gremeaux V, et al. Selecting a test for the clinical assessment of balance and walking capacity at the definitive fitting state after unilateral amputation: a comparative study. *Prosthet Orthot Int*. 2012;36:415-422. [8] Parker K, et al. Ambulation of people with lower-limb amputations: relationship between capacity and performance measures. *Arch Phys Med Rehabil*. 2010;91:543-549. [9] Bohannon RW, et al. Two-minute walk test performance by adults 18 to 85 years: normative values, reliability and responsiveness. *Arch Phys Med Rehabil*. 2015;96:472-477.