

**American College of Physicians - Internal Medicine Meeting 2025
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Function Focused Gait Assessment

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Function-Focused Gait Assessment - Objective Measures of Activity Performance

This handout is a compilation of objective measures that can be employed in any clinical setting and by any trained observer. These specific objective measures that can be used for serial measurements in follow-up appointments. When more detailed objective measures are needed, consider referring the patient to a physical or occupational therapist.

Inspection/Observation:

Gait Pattern? Normal Ataxic Antalgic Other _____

Assistive Device? None Rolling walker Standard walker Quad Cane Single Point Cane Crutches
 Other _____

Orthotics? (circle) Left Right Ankle-Foot Knee-Ankle-Foot Shoe Insert Other _____

Leg Length Discrepancy?

Leg length measured from anterior iliac spine to medial malleolus in supine position:
 (Normal < 2 cm side-to-side difference)

Left Leg	Right Leg
cm	cm

Examination

Active Range of Motion

Left	Flexion	Extension	Abduction	Adduction	Right	Flexion	Extension	Abduction	Adduction
Hip	°	°	°	°	Hip	°	°	°	°
Knee	°			°	Knee	°	°	°	°
Ankle	°	°	°	°	Ankle	°	°	°	°

Isolated Strength	Left	Right	Instructions to patient
Quadriceps	/5	/5	“Stand on one leg and then the other”
Gluteus Medius	/5	/5	“Stand on one leg and swing other leg out from body”
Tibialis Anterior	/5	/5	“Rock back on your heels”
Gastrocnemius	/5	/5	“Stand on your toes”

Sensation (Present / Absent)	Left	Right
Light Touch		
Great Toe Proprioception		
Vibration Perception		

Deep Tendon Reflexes	Left	Right
Patellar		
Achilles		

Functional

Standing Time (seconds)	Feet together touching =	One Foot advanced - _	Feet Tandem - -
Normal > 10 seconds	sec	sec	sec

Timed Up and Go

Mark a line 3m (10ft) from patient’s chair. Patient sits in chair. “When I say go, stand up and walk to line, turn around and return to your seat. Walk at your usual pace. You may use your (assistive device).”

Time measured from moment patient stands to sitting down:

sec

Age	60-69	70-75	76-80	81-85	86-99
Men	7.3	8.6	9.4	10.3	11.1
Women	8.1	9.8	10.7	12.4	13.2

Five Times Sit to Stand

Patient sits in armless chair. "When I say go, stand up and sit down 5 times in a row as quickly as you can. Be sure to stand up fully and try not to let your back touch the chair back between each repetition. Do not use or push your legs against the back of the chair." Time measured from moment patient begins to stand to last sitting down:

sec

Age	60-69	70-79	80-89
Time	11.4	12.6	14.8

4-Meter Walking Speed Test

Mark a total distance of 6 meters, place markers at end, make internal markers 1 meter in. Patient stands at the 0-meter mark. There are two trials performed measuring time to walk both directions.

Normal Pace: "When I say go, walk at normal pace past the far mark." Patient turns around and stops at the 6-meter mark. "When I say go, walk at normal pace back to the starting mark."

Time is measured from moment patient crosses the 1-meter and stops when crossing the 5-meter marks: T_1 sec

Time is measured in same format coming back: T_2 sec

Take the average of both times. $(T_1 + T_2)/2 = T_{avg}$ sec

Divide 4 by the average time to get walking speed in m/sec: $4 \text{ m}/T_{avg} = \text{Walking Speed}$ m/s

Fast Pace: "When I say go, walk at your fastest pace past the far mark." Patient turns around and stops at the 6-meter mark. "When I say go, walk at your fastest pace back to the starting mark."

Time is measured from moment patient crosses the 1-meter and stops when crossing the 5-meter marks: T_1 sec

Time is measured in same format coming back: T_2 sec

Take the average of both times. $(T_1 + T_2)/2 = T_{avg}$ sec

Divide 4 by the average time to get walking speed in m/sec: $4 \text{ m}/T_{avg} = \text{Walking Speed}$ m/s

Walking speed is compared over time with each new measurement compared to the previous one. Multiply by 2.24 to convert to mph for patient's understanding: $\text{Walking Speed (m/s)} \times 2.24 = \text{Walking Speed (miles per hour)}$ mph

Clinically significant decline in walking speed over time > 0.10 m/sec

Negligible decline in walking speed over time < 0.05 m/sec

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Comments/Questions/Suggestions?

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Pathologic Gait Descriptions

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 IM Conference 2025

<u>Gait</u>	<u>Description</u>	
	<u>Standing</u>	<u>Ambulating</u>
Hemiplegic "Circumduction"	<ul style="list-style-type: none"> - Affected arm flexed, adducted, internally rotated. - Affected leg extended, plantarflexed 	<ul style="list-style-type: none"> - Affected arm loss of normal arm swing - Weight shifted to the contralateral side. - Unable to flex hip and knee. - Affected leg circumducts and hip hikes to clear ankle dorsiflexion weakness.
Diplegic "Scissoring"	<ul style="list-style-type: none"> - Tight hip adductors bilaterally resulting in genu valgum of knees. - Hips and knees are in the flexed position - Ankles are internally rotated 	<ul style="list-style-type: none"> - Forward posture of the upper body with arms in the flexed position. - The lower limbs swing outward and create a scissoring pattern with legs crossing midline. - Both legs will be dragged, toes will be scrapped - Patients will toe walk.
Neuropathic "Steppage Gait"	<ul style="list-style-type: none"> - No issues seen 	<ul style="list-style-type: none"> - No dorsiflexion of the ankle. - To clear the toes there will be exaggerated knee and/or hip flexion.

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		<ul style="list-style-type: none"> - Toes hit first, then heels = double-tap phenomenon.
<p>Myopathic</p> <p>“Trendelenburg”</p> <p>Or</p> <p>“Waddling Gait”</p>	<ul style="list-style-type: none"> - No deficit. 	<p><u>Unilateral Issue:</u></p> <ul style="list-style-type: none"> - Trendelenburg sign → Contralateral pelvis drop and upper body weight is shifted to the weight-bearing limb. <p><u>Bilateral Issue:</u></p> <ul style="list-style-type: none"> - Waddling sign → Circumduction of BLE. Truncal lean to the weight-bearing side to allow circumduction of the opposite limb.
<p>Choreiform Gait</p> <p>“Hyperkinetic Gait”</p>	<ul style="list-style-type: none"> - Irregular, jerky, involuntary movements in all extremities. - twisting movements of the trunk, head, arms, and legs. 	<ul style="list-style-type: none"> - unpredictable accelerations and decelerations in walking speed. - Walking can worsen the baseline movements.
<p>Ataxic Gait</p> <p>“Cerebellar Gait”</p>	<ul style="list-style-type: none"> - Titubation = body swaggers back and forth. 	<ul style="list-style-type: none"> - Clumsy gait, veer laterally. - Lack of coordination, slow walking speed. - Difficulty with stops and turns. - Cannot walk in straight line.

Pathologic Gait Descriptions

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		<ul style="list-style-type: none"> - Poor balance, wide base of support. - Inconsistent arm swing.
Parkinsonian Gait “Hypokinetic Gait”	<ul style="list-style-type: none"> - Stooped forward with head and neck in forward flexion, knees in flexion. - Parkinson’s signs: <ul style="list-style-type: none"> o Masked faces, tremors. 	<ul style="list-style-type: none"> - Slow, small shuffling steps. - Rigidity and bradykinesia. - Decreased arm swing. - Difficulty initiating steps. - Increased number of steps to turn. - Balance abnormality
Sensory Gait “Stomping Gait”	<ul style="list-style-type: none"> - Decreased proprioception 	<ul style="list-style-type: none"> - Patient looking toward the ground to see where their feet are in space. - The affected foot slams onto the ground to provide sensory feedback. - High leg lift, with excessive knee flexion. - Symptoms exacerbated when patients cannot see their feet (ie. darkness).

DURABLE MEDICAL EQUIPMENT (DME)

- Life Expectancy
 - 5 years
 - Unless lost, stolen, or accidentally damaged beyond repair (includes natural disasters)
 - Or, change in patient's condition
 - Will pay for repairs if worn out before end of its lifetime
- Eligibility
 - Medically Necessary
 - Needed for home use

CANES

- Quad Cane: Narrow Base or Small Base vs. Wide Base or Large Base (NBQC or SBQC vs. WBQC or LBQC)
 - Neuropathic Gait – s/p CVA or BI
 - Improved stability – sacrificed mobility/maneuverability vs. SPC
 - Challenging to navigate stairs
- All Terrain Cane: “Hurry Cane”
 - Provides increased stability compared to single point cane
 - Provides more maneuverability compared to quad cane
- Single Point Cane (SPC): Mild balance deficit, not much of any weight bearing
- Fit: to crease of wrist when standing with hand relaxed at their side
- Which hand? Opposite of involved leg

WALKERS

- Standard Walker: no wheels, step to gait pattern
- Rolling Walker with Platform Attachment: useful if NWB of wrist/hand or hemiplegia
- Rolling Walker (RW or FWW): 2 front wheels, reciprocal gait pattern, ~ 5-7 lbs.
- Rollator Walker: 4 wheels, seat, brakes, typically 11-21 lbs.
- Hemi-Walker: unilateral device, hemiplegia, early gait trainer

ORTHOTICS

- Molded Ankle Foot Orthosis (MAFO):
 - Eligibility:
 - Expected need is > 6 months
 - Need to control the knee, ankle, or foot in > 1 plane
 - Could not be fitted with pre-fabricated orthotic
 - Pros: Custom, modifiable after fabrication, multi-plane control, more stability
 - Cons: Little energy return, doesn't allow for fluctuating edema, less mobility
- Carbon Fiber (AFO):
 - Eligibility:
 - Ambulatory

Promoting a Functional Gait

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- Diagnosis of weakness/deformity of foot & ankle – need for stabilization
- Potential to benefit functionally
- Condition is permanent or longstanding duration
- Pros: Stronger, lighter, minimalist design, increased kinetic energy
- Cons: Less custom, generally less medial/lateral support, generally not modifiable after fabrication
- Functional Electrical Stimulation:
 - Helps to lift the foot during swing phase if there is drop foot
 - Not covered by Medicare
 - Common Peroneal Nerve needs to be intact
 - Bioness L300 (Go) or Walk Aide