



The Lower Extremities

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Disclosure Statement

- I have received nothing of value from any organization or company
- Volunteer positions
 - COA
 - AAOS
 - AOFAS
 - Assistant journal editor

The Lower Extremities

- This is not basic report writing
- This is not basic impairment rating
- Attend COA report writing course
- This is how I consider impairment ratings
- KISS

The Lower Extremities

- Feet
- Hindfeet
- Ankles
- Legs
- Knees
- Hips
- Pelvis

Evaluate on basis of anatomic changes, diagnostic categories, and functional changes

Impairment Evaluation Methods

- Not mutually exclusive
- Functional methods when documented

Table 17-1 Methods Used to Evaluate Impairments of the Lower Extremities

Assessment Type	Method	Section Number
Anatomic (1-9)	1. Limb length discrepancy	17.2b
	2. Muscle atrophy	17.2d
	3. Ankylosis	17.2g
	4. Amputation	17.2i
	5. Arthritis of joints	17.2h
	6. Skin loss	17.2k
	7. Peripheral nerve injury	17.2l
	8. Vascular	17.2n
	9. Causalgia/reflex sympathetic dystrophy (CRPS)	17.2m
Functional (10-12)	10. Range of motion	17.2f
	11. Gait derangement	17.2c
	12. Muscle strength (manual muscle testing)	17.2e
Diagnosis based (13)	Fractures	17.2j
	Ligament injuries	17.2j
	Meniscectomies	17.2j
	Foot deformities	17.2j
	Hip and pelvic bursitis	17.2j
	Lower extremity joint replacements	17.2j

Permanent Impairment

■ Anatomic loss:

- Damage to the organ system or body structure
- Common in musculoskeletal sections

■ Functional loss:

- Change in function for the organ system or body structure
- Important for ADL (work)

The Lower Extremities

- What is the problem
- Lower extremity impairment undervalues work disability



Impairment Rating

- Impairment ratings are not intended for use as a direct determinant of work disability
- 30% impairment \neq 30% reduction in work capacity
- Greater effect on laborer than sedentary worker
- Impairment rating does not measure work disability

The Lower Extremities

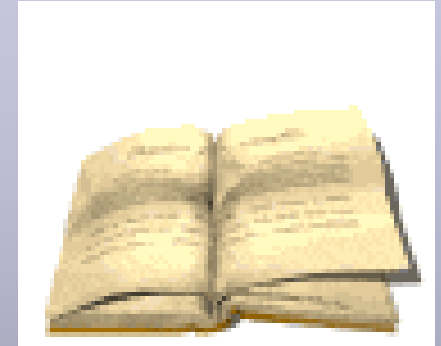
- Guides has many inconsistencies
- If more than one method can be used, the method that provides the higher rating should be adopted

AMA Guides 5th Edition

- Required to use Guides
- Four corners of the Guides

AMA Guides 5th Edition

- Required to use Guides
- Four corners of the Guides
- **My book has three dimensions**
- **My book has eight corners**
- **Look deeper into the book**
- **Use Guides to provide highest rating**



The Lower Extremities

- “Calculating the whole person impairment by combining the lower extremity impairments and multiplying by 0.4 should be the same as converting each lower extremity impairment to whole person impairment and then combining the whole person impairments. In cases where they are not equal, the evaluator should use the higher value”

The Lower Extremities

- Lower extremity impairment
 - LE impairment x 0.4 = whole person
- Whole person impairment

The Lower Extremities

- Anatomy
- Diagnosis based estimates
- Function: More important clinically and often rates higher
 - Gait
 - Range of motion
 - Muscle strength

Chapter 17 tables

- Incorporate into report
- Document injured worker's findings
- Show them your work

Table 17-2 Guide to the Appropriate Combination of Evaluation Methods

Open boxes indicate impairment ratings derived from these methods can be combined.

	Limb Length Discrepancy	Gait Derangement	Muscle Atrophy	Muscle Strength	ROM Ankylosis	Arthritis (DJD)	Amputation	Diagnosis-Based Estimates (DBE)	Skin Loss	Peripheral Nerve Injury	Complex Regional Pain Syndrome (CRPS)	Vascular
Limb Length Discrepancy		X					X					
Gait Derangement	X		X	X	X	X	X	X	X	X	X	X
Muscle Atrophy		X		X	X	X	X	X		X	X	
Muscle Strength		X	X		X	X		X		X	0	
ROM Ankylosis		X	X	X		X		X			0	
Arthritis (DJD)		X	X	X	X							
Amputation	X	X	X	X								
Diagnosis-Based Estimates (DBE)		X	X	X	X							
Skin Loss		X										
Peripheral Nerve Injury		X	X	X							X	
Complex Regional Pain Syndrome (CRPS)		X	X	0	0					X		X
Vascular		X									X	

X = Do not use these methods together for evaluating a single impairment.

0 = See specific instructions for CRPS of the lower extremity.

Cross Usage Chart

- Limb length discrepancy
- Gait derangement
- Atrophy
- Muscle strength
- Range of motion / ankylosis
- Arthritis
- Amputation
- Diagnosis Based estimates
- Skin loss
- Nerve injury
- CRPS
- Vascular

Table 17-2 Guide to the Appropriate Combination of Evaluation Methods

Open boxes indicate impairment ratings derived from these methods can be combined.

	Limb Length Discrepancy	Gait Derangement	Muscle Atrophy	Muscle Strength	ROM Ankylosis	Arthritis (DJD)	Amputation	Diagnosis-Based Estimates (DBE)	Skin Loss	Peripheral Nerve Injury	Complex Regional Pain Syndrome (CRPS)	Vascular
Limb Length Discrepancy		X					X					
Gait Derangement	X		X	X	X	X	X	X	X	X	X	X
Muscle Atrophy		X		X	X	X	X	X		X	X	
Muscle Strength		X	X		X	X		X		X	0	
ROM Ankylosis		X	X	X		X		X			0	
Arthritis (DJD)		X	X	X	X							
Amputation	X	X	X	X								
Diagnosis-Based Estimates (DBE)		X	X	X	X							
Skin Loss		X										
Peripheral Nerve Injury		X	X	X							X	
Complex Regional Pain Syndrome (CRPS)		X	X	0	0					X		X
Vascular		X									X	

X = Do not use these methods together for evaluating a single impairment.

0 = See specific instructions for CRPS of the lower extremity.

Cross Usage Chart

- Explain why method chosen
- Chose method that is most clinically accurate
- Combine methods with combined values chart
- Chose method that give highest impairment rating

Lower Extremity Impairment

- Separate methods on same region
- Combine regional impairments
- Then convert to whole person impairment rating
- I work in whole person impairment

Table 17-3 Whole Person Impairment Values Calculated From Lower Extremity Impairment

% Impairment of		% Impairment of		% Impairment of	
Lower Extremity	Whole Person	Lower Extremity	Whole Person	Lower Extremity	Whole Person
0	= 0	34	= 14	68	= 27
1	= 0	35	= 14	69	= 28
2	= 1	36	= 14	70	= 28
3	= 1	37	= 15	71	= 28
4	= 2	38	= 15	72	= 29
5	= 2	39	= 16	73	= 29
6	= 2	40	= 16	74	= 30
7	= 3	41	= 16	75	= 30
8	= 3	42	= 17	76	= 30
9	= 4	43	= 17	77	= 31
10	= 4	44	= 18	78	= 31
11	= 4	45	= 18	79	= 32
12	= 5	46	= 18	80	= 32
13	= 5	47	= 19	81	= 32
14	= 6	48	= 19	82	= 33
15	= 6	49	= 20	83	= 33
16	= 6	50	= 20	84	= 34
17	= 7	51	= 20	85	= 34
18	= 7	52	= 21	86	= 34
19	= 8	53	= 21	87	= 35
20	= 8	54	= 22	88	= 35
21	= 8	55	= 22	89	= 36
22	= 9	56	= 22	90	= 36
23	= 9	57	= 23	91	= 36
24	= 10	58	= 23	92	= 37
25	= 10	59	= 24	93	= 37
26	= 10	60	= 24	94	= 38
27	= 11	61	= 24	95	= 38
28	= 11	62	= 25	96	= 38
29	= 12	63	= 25	97	= 39
30	= 12	64	= 26	98	= 39
31	= 12	65	= 26	99	= 40
32	= 13	66	= 26	100	= 40
33	= 13	67	= 27		

Lower Extremity Impairment

- Lower extremity impairment x 0.4 = Whole person impairment
- Evaluate each area separately
- Convert to whole person
- Combine using combined values chart

Gait Derangement

- Always a secondary condition
- Support with pathologic findings
- Do not combine with other methods
- Do not use if subjective symptoms only
- Assistive device required
- Example 17.2

Table 17-5 Lower Limb Impairment Due to Gait Derangement

Severity	Individual's Signs	Whole Person Impairment
Mild	a. Antalgic limp with shortened stance phase and documented moderate to advanced arthritic changes of hip, knee, or ankle	7%
	b. Positive Trendelenburg sign and moderate to advanced osteoarthritis of hip	10%
	c. Same as category a or b above, but individual requires part-time use of cane or crutch for distance walking but not usually at home or in the workplace	15%
	d. Requires routine use of short leg brace (ankle-foot orthosis [AFO])	15%
Moderate	e. Requires routine use of cane, crutch, or long leg brace (knee-ankle-foot orthosis [KAFO])	20%
	f. Requires routine use of cane or crutch and a short leg brace (AFO)	30%
	g. Requires routine use of two canes or two crutches	40%
Severe	h. Requires routine use of two canes or two crutches and a short leg brace (AFO)	50%
	i. Requires routine use of two canes or two crutches and a long leg brace (KAFO)	60%
	j. Requires routine use of two canes or two crutches and two lower-extremity braces (either AFOs or KAFOs)	70%
	k. Wheelchair dependent	80%

Station, Gait and Movement Disorders

- Impairment determined by effect on ambulation
- Use for complex regional pain syndrome

Table 13-15 Criteria for Rating Impairments Due to Station and Gait Disorders

Class 1 1%-9% Impairment of the Whole Person	Class 2 10%-19% Impairment of the Whole Person	Class 3 20%-39% Impairment of the Whole Person	Class 4 40%-60% Impairment of the Whole Person
Rises to standing position; walks, but has difficulty with elevations, grades, stairs, deep chairs, and long distances	Rises to standing position; walks some distance with difficulty and without assistance, but is limited to level surfaces	Rises and maintains standing position with difficulty; cannot walk without assistance	Cannot stand without help, mechanical support, and/or an assistive device

Joint Ankylosis

Joint	Whole Person %
Hip	20
Knee	27
Ankle	4
Pantalar	10

Diagnosis Based Estimates

Table 17-33 Impairment Estimates for Certain Lower Extremity Impairments

Region and Condition	Whole Person (Lower Extremity) [Foot] Impairment (%)	Region and Condition	Whole Person (Lower Extremity) [Foot] Impairment (%)
Pelvis*			
Pelvic fracture Undisplaced, nonarticular, healed, without neurologic deficit or other sign	0	Knee	
Displaced nonarticular fracture: estimate by evaluating shortening and weakness	—	Patellar subluxation or dislocation with residual instability	3 (7)
Acetabular fracture: estimate according to range of motion and joint changes	—	Patellar fracture Undisplaced, healed	3 (7)
Sacroiliac joint fracture: consider displacement	1-3 (2-7)	Articular surface displaced more than 3 mm	5 (12)
Ischial bursitis (weaver's bottom) requiring frequent unweighting and limiting of sitting time	3 (7)	Displaced with nonunion	7 (17)
Hip			
Total hip replacement; includes endoprosthesis, unipolar or bipolar		Patellectomy Partial	3 (7)
Good results, 85-100 points†	15 (37)	Total	9 (22)
Fair results, 50-84 points†	20 (50)	Meniscectomy, medial or lateral Partial	1 (2)
Poor results, less than 50 points†	30 (75)	Total	3 (7)
Femoral neck fracture, healed in Good position	Evaluate according to examination findings	Meniscectomy, medial and lateral Partial	4 (10)
Malunion	12 (30) plus range-of-motion criteria	Total	9 (22)
Nonunion	15 (37) plus range-of-motion criteria	Cruciate or collateral ligament laxity Mild	3 (7)
Girdlestone arthroplasty Or estimate according to examination findings; use the greater estimate	20 (50)	Moderate	7 (17)
Trochanter bursitis (chronic) with abnormal gait	3 (7)	Severe	10 (25)
Femoral shaft fracture			
Healed with 10°-14° angulation or malrotation	10 (25)	Cruciate and collateral ligament laxity Moderate	10 (25)
15°-19°	18 (45)	Severe	15 (37)
20°	+1 (2) per degree up to 25 (62)	Plateau fracture Undisplaced	2 (5)
		Displaced 5°-9° angulation	5 (12)
		10°-19° angulation	10 (25)
		20°+ angulation	+1 (2) per degree up to 20 (50)
		Supracondylar or intercondylar fracture Undisplaced fracture	2 (5)
		Displaced fracture 5°-9° angulation	5 (12)
		10°-19° angulation	10 (25)
		20°+ angulation	+1 (2) per degree up to 20 (50)

* Refer also to Section 15.14 on the pelvis.

† See Table 17-34 or Table 17-35 for point rating system.

‡ A stress x-ray is an anterior-posterior view taken with a varus or valgus stress applied by a knowledgeable physician.

§ The tibia-os calcis angle is measured as shown in Figure 17-7.

Region and Condition	Whole Person (Lower Extremity) [Foot] Impairment (%)	Region and Condition	Whole Person (Lower Extremity) [Foot] Impairment (%)
Total knee replacement including unicompartmental replacement Good result, 85-100 points†	15 (37)	Loss of tibia-os calcis angle§ Angle is 120°-110°	5 (12) [17]
Fair results, 50-84 points†	20 (50)	Angle is 100°-90°	8 (20) [28]
Poor results, less than 50 points†	30 (75)	Angle is less than 90°	+1 (2) [3] per degree up to 15 (37) [54]
Proximal tibial osteotomy Good result	10 (25)	Intra-articular fracture with displacement Subtalar bone	6 (15) [21]
Poor result	Estimate impairment according to examination and arthritic degeneration	Talonavicular bone	3 (7) [10]
		Calcaneocuboid bone	3 (7) [10]
Tibial shaft fracture, malalignment of			
10°-14°	8 (20)	Midfoot deformity	
15°-19°	12 (30)	Cavus Mild	1 (2) [3]
20°+	+1 (2) per degree up to 20 (50)	Moderate	3 (7) [10]
Ankle			
Ligamentous instability (based on stress x-rays‡) Mild (2-3 mm excess opening)	2 (5) [7]	"Rocker bottom" Mild	2 (5) [7]
Moderate (4-6 mm)	4 (10) [14]	Moderate	4 (10) [14]
Severe (> 6 mm)	6 (15) [21]	Severe	8 (20) [28]
Avascular necrosis of the talus Without collapse			
Fracture Extra-articular with angulation		With collapse	6 (15) [21]
10°-14°	6 (15) [21]	Forefoot deformity	
15°-19°	10 (25) [35]	Metatarsal fracture with loss of weight transfer 1st metatarsal	4 (10) [14]
20°+	+1 (2) [3] per degree up to 15 (37) [53]	5th metatarsal	2 (5) [7]
Intra-articular with displacement	8 (20) [28]	Other metatarsal	1 (2) [3]
Metatarsal fracture with plantar angulation and metatarsalgia 1st metatarsal			
Hindfoot			
Fracture Extra-articular (calcaneal)		4th metatarsal	4 (10) [14]
With varus angulation 10°-19°	5 (12) [17]	5th metatarsal	2 (5) [7]
With varus angulation 20°+	0.5 (1) [1] per degree up to 10 (25)	Other metatarsal	1 (2) [3]
With valgus angulation 10°-19°	3 (7) [11]		
With valgus angulation 20°+	0.5 (2) [1] per degree up to 10 (25) [35]		

Diagnosis Based Estimates

THR / TKR

- For hip and knee replacement, rate first with table 17-34 or 17-35
- Apply table 17-33
 - Good result: 15% whole person
 - Poor result: 30% whole person
- If both THR and TKR combine impairments with combined values chart

Trimalleolar Ankle Fracture

- 54 y/o female: 9 months s/p ORIF.
 - Joint space preserved
 - Motion 50% of normal
 - 1.5 cm calf atrophy
 - Able to stand and walk 4 hours day
 - Uses cane full time when out of house

Trimalleolar Ankle Fracture

- Option 1: DBE = 8% wp
- Option 2: Atrophy = 2% wp
- Option 3: Range motion = 3% wp

Trimalleolar Ankle Fracture

- Option 1: DBE: 8% wp
- Option 2: Atrophy: 2% wp
- Option 3: Range motion: 3% wp
- **Option 4: Gait: 20% wp**

Severity	Individual's Signs	Whole Person Impairment
Moderate	e. Requires routine use of cane, crutch, or long leg brace (knee-ankle-foot orthosis [KAFO])	20%

Calcaneus Fracture

- 39 y/o Hispanic roofer: 12 months s/p ORIF
 - Hindfoot neutral
 - No hindfoot motion
 - Ankle motion 50% of normal
 - 2 cm calf atrophy
 - Subtalar joint space 0 mm
 - Tibia-Os calcis angle 115 degrees
 - Cannot return to work

Calcaneus Fracture

- Option 1: Atrophy: 3% wp
- Option 2: Range motion: 3% wp + ankylosis: 4% = 7% wp

Calcaneus Fracture

- Option 1: Atrophy: 3% wp
- Option 2: Range motion: 3% wp,
ankylosis: 4% = 7% wp
- **Option 3: DBE: 6% wp +
arthritis: 10% = 15% wp**

Calcaneus Fracture

- **Option 3: DBE: 6% wp + arthritis: 10% = 15% wp**
- **Option 4:**

Table 13-15 Criteria for Rating Impairments Due to Station and Gait Disorders

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Rises to standing position; walks, but has difficulty with elevations, grades, stairs, deep chairs, and long distances	Rises to standing position; walks some distance with difficulty and without assistance, but is limited to level surfaces	Rises and maintains standing position with difficulty; cannot walk without assistance	Cannot stand without help, mechanical support, and/or an assistive device



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