2015 Lower Extremity MMI and Impairment Rating

Disclaimer

The videos presented in this training are made available by the Texas Department of Insurance/Division of Workers' Compensation (TDI-TWC) for educational purposes only. The videos are not intended to represent the only method or procedure appropriate for the medical situation discussed. Rather, they are intended to present an approach, method, or procedure that faculty could have utilized in the presented medical situations, which may be helpful to others who face similar situations.

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MMI/IR – Lower Extremity Case 1

History of Injury

- A 25-year-old landscaper was planting a hedge when he stepped in a hole and twisted his right knee.
- By the next morning, his knee was swollen and he had difficulty with walking.
- He saw his family physician the next day and was diagnosed with a knee sprain.

MMI/IR – Lower Extremity Case 1

Treatment History

- Initial treatment included ibuprofen and ice and he was taken off work for one week.
- When he returned for follow up in one week, he was no better with persistent swelling and loss of range of motion.
- He was sent for an MRI scan of his right knee.

MMI/IR – Lower Extremity Case 1

Treatment History

- The MRI scan showed an oblique tear of the posterior horn of the medial meniscus and a partial tear of the anterior cruciate ligament.
- His family physician referred him to an orthopaedic surgeon.

MMI/IR – Lower Extremity Case 1

Treatment History

- Four weeks post-injury, he saw an orthopaedic surgeon who recommended arthroscopic partial medial meniscectomy and ACL reconstruction.
- The patient really wanted to avoid surgery and the surgeon prescribed physical therapy 3 times a week for 4 weeks.

MMI/IR – Lower Extremity Case 1

- **Treatment History**
  - When he completed physical therapy, he had less swelling, improved range of motion, strength, and better functional activity. He wished to try returning to work at full duty.
  - However, when he returned to landscaping work, his knee kept locking and giving way.
  - He returned to the orthopaedic surgeon to pursue surgery.

MMI/IR – Lower Extremity Case 1

Designated Doctor Visit

- He is seen 3 weeks post-op from a right knee arthroscopic partial medial meniscectomy and ACL reconstruction.
- He is scheduled to begin physical therapy next week.

MMI/IR – Lower Extremity Case 1

- **Designated Doctor Physical Examination**
  - Stable vital signs, height 6 feet 1 inch, weight 180 lbs.
  - Right knee shows healing surgical wounds and arthroscopic portals.
  - His gait shows a shortened stance phase on the right, but he is not using any assistive device.

MMI/IR – Lower Extremity Case 1

- **Designated Doctor Physical Examination**
  - He has mild right knee swelling and a moderate effusion.
  - He has atrophy of the right VMO with right thigh circumference of 51 cm and left of 53 cm.
  - Some weakness to right quad set, 4/5 strength of right knee extension and flexion.
  - His right knee ROM is extension -5 degrees and flexion of 100 degrees.

MMI/IR - Lower Extremity Case 1

Designated Doctor Physical Examination

- Based on the medical records and your physical examination of the injured employee, what is the compensable injury for certifying MMI and IR?

Is he at MMI?

- Why or why not?

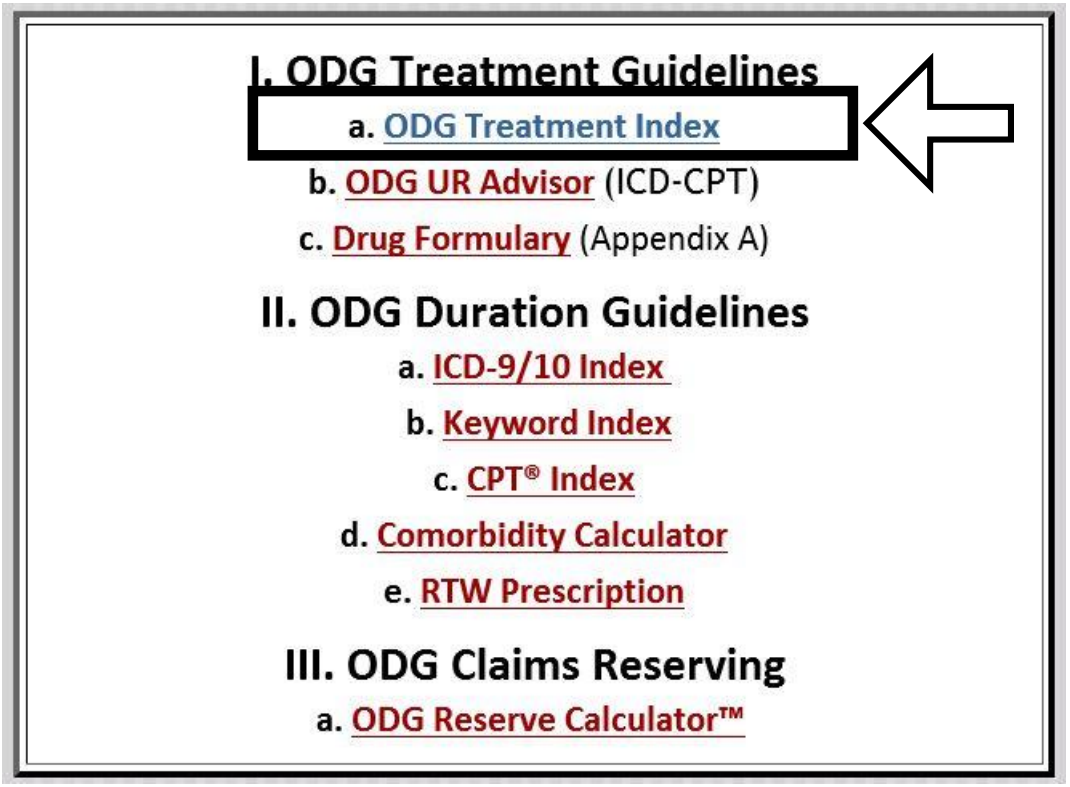
- What should the Designated Doctor use to decide?

MMI/IR - Lower Extremity Case 1

Log on to ODG…

2015

Official Disability Guidelines (20th annual edition) & ODG Treatment in Workers' Comp (13th annual edition)



Fitness for Duty (updated 04/27/15)

Forearm, Wrist, & Hand (updated 05/11/15)

Head (updated 01/21/15)

Hernia (updated 06/05/15)

Hip & Pelvis (updated 10/09/14)

Infectious Diseases (updated 06/08/15)

Knee & Leg (updated 05/05/15)

Low Back (updated 05/15/15)

Mental Illness & Stress (updated 03/25/15)

Neck & Upper Back (updated 05/12/15)

Pain (updated 06/15/15)

Pulmonary (updated 05/27/15)

Shoulder (updated 05/04/15)

ODG -TWC

ODG Treatment

Integrated Treatment/Disability Duration Guidelines

Knee & Leg (Acute & Chronic)

Back to ODG - TWC Index

(updated 05/05/15)

CONTENTS

(1) Treatment Planning..... 2

(2) Codes for Automated Approval 6

(3) **Procedure Summary** 8

Reference Summaries.....144

(Including findings, evaluations, and ratings; click on PMID# for complete abstracts)

Procedure Summary -- Knee

Procedure/topic	Summary of medical evidence
Click to jump ahead: A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X	
ACI	See Autologous cartilage implantation.
ACL diagnostic tests	Recommended as indicated below. Diagnostic tests for assessing ruptures of the anterior cruciate ligament: The pivot shift test seems to have favorable positive predictive value, and the Lachman test has good negative predictive value. (Scholten, 2003) Based on predictive value statistics, it can be concluded that during the physical examination, a positive result for the pivot shift test is the best for ruling in an ACL rupture, whereas a negative result to the Lachman test is the best for ruling out an ACL rupture. It can also be concluded that, solely using sensitivity and specificity values, the Lachman test is a better overall test at both ruling in and ruling out ACL ruptures. The anterior drawer test appears to be inconclusive for drawing strong conclusions either way. (Ostrowski, 2006) See also Lachman test and Pivot shift test.
ACL injury rehabilitation	Recommended as indicated below. Studies that compare at-home rehab to supervised rehab for patients who have had an ACL injury are of low quality and show that more studies are necessary before a conclusion can be drawn as to the most effective therapy. (Beard, 1998) (Thomson-Cochrane, 2002) One meta-analysis compared studies to examine the evidence for effectiveness of various physical therapist-led rehabilitation programs, and of various interventions used within these programs, for rehabilitation of acute or chronic ACL, MCL or meniscal injuries of the knee in adults. The reviewer concluded that the available evidence for physical therapist-led rehabilitation of ACL, MCL and meniscal injuries is wide ranging in terms of scope but insufficient to establish the relative effectiveness of the various approaches and methods in current use. (Thomson, 2002) A trial testing the efficacy of a 6-week rehabilitation program determined that six weeks rehabilitation is too short a time period from original injury to obtain normal mobility and restored knee function. (Zatterstrom, 1998) A 12-month follow-up of a controlled trial that tested supervised versus self-monitored training and rehabilitation for ACL repair determined that initial guidance is an important part of the rehabilitation process. Zatterstrom, 2000) Knee bracing after ACL reconstruction appears to be largely useless, according to a systematic review. Range-of-motion, strengthening, and functional exercises remain the cornerstone of postoperative ACL rehabilitation. The most important rehab for ACL surgery patients is to start physical therapy early and rigorously. Postoperative bracing did not protect against reinjury, decrease pain, or improve stability. Accelerated rehabilitation (starting at 3 weeks postoperatively rather than the traditional 3 months and intended to reduce the usual 6-month time for return to activity) was considered to be safe according to this review. The authors conclude that immediate postoperative weight-bearing, range of knee motion from 0° to 90° of flexion, and strengthening with closed-chain exercises are likely to be safe. They also suggest that starting eccentric quadriceps strengthening and isokinetic hamstring strengthening at week 3 after surgery may accelerate recovery. The reviewers found promising data for home-based rehabilitation for the motivated patient, but found doubtful support for neuromuscular training such as proprioceptive and balance training, perturbation training, and vibratory stimulation. (Kruse, 2012) See also Physical Therapy Guidelines.
ACL reconstruction	See Anterior cruciate ligament (ACL) reconstruction.
Activity restrictions	See Work.
[illegible]	Not recommended. In recent years, the use of Autologen® in sports medicine has caused a lot of controversy in many sports disciplines. Although it is unlikely for this deproteinized substance to

Physical Medicine Treatment

Phonophoresis	Recommended as an option. Phonophoresis refers to use of ultrasound to deliver therapeutic medications to subcutaneous tissues. This modality may be useful for inflammatory conditions including tendonitis, arthritis, and bursitis, and contraindications are the same as for ultrasound. (Rand, 2007)
Physical medicine treatment	Recommended. Positive limited evidence. As with any treatment, if there is no improvement after 2-3 weeks the protocol may be modified or re-evaluated. See also specific modalities. (Philadelphia, 2001) Acute muscle strains often benefit from daily treatment over a short period, whereas chronic injuries are usually addressed less frequently over an extended period. It is important for the physical therapy provider to document the patient's progress so that the physician can modify the care plan, if needed. The physical therapy prescription should include diagnosis; type, frequency, and duration of the prescribed therapy; preferred protocols or treatments; therapeutic goals; and safety precautions (eg, joint range-of-motion and weight-bearing limitations, and concurrent illnesses). (Rand, 2007) Controversy exists about the effectiveness of physical therapy after arthroscopic partial meniscectomy. (Goodwin, 2003) A randomised controlled trial of the effectiveness of water-based exercise concluded that group-based exercise in water over 1 year can produce significant reduction in pain and improvement in physical function in adults with lower limb arthritis, and may be a useful adjunct in the management of hip and/or knee arthritis. (Cochrane, 2005) Functional exercises after hospital discharge for total knee arthroplasty result in a small to moderate short-term, but not long-term, benefit. In the short term physical therapy interventions with exercises based on functional activities may be more effective after total knee arthroplasty than traditional exercise programs, which concentrate on isometric muscle exercises and exercises to increase range of motion in the joint. (Lowe, 2007) Supervised therapeutic exercise improves outcomes in patients who have osteoarthritis or claudication of the knee. Compared with home exercise, supervised therapeutic exercise has been shown to improve walking speed and distance. (Rand, 2007) A physical therapy consultation focusing on appropriate exercises may benefit patients with OA, although this recommendation is largely based on expert opinion. The physical therapy visit may also include advice regarding assistive devices for ambulation. (Zhang, 2008) Accelerated perioperative care and rehabilitation intervention after hip and knee arthroplasty (including intense physical therapy and exercise) reduced mean hospital length of stay (LOS) from 8.8 days before implementation to 4.3 days after implementation. (Larsen, 2008) In patients with ACL injury willing to moderate activity level to avoid reinjury, initial treatment without ACL reconstruction should be considered. All ACL-injured patients need to begin knee-specialized physical therapy early (within a week) after the ACL injury to learn more about the injury, to lower the activity level while performing neuromuscular training to restore the functional stability, and as far as possible avoid further giving-way or re-injuries in the same or the other knee, irrespectively if ACL is reconstructed or not. (Neuman, 2008) Limited gains for most patients with knee OA. (Bennell, 2005) More likely benefit for combined manual physical therapy and supervised exercise for OA. (Deyle, 2000) Many patients do not require PT after partial meniscectomy. (Morrissey, 2006) There are short-term gains for PT after TKR. (Minns Lowe, 2007) Physical therapy and patient education may be underused as treatments for knee pain, compared to the routine prescription of palliative medication. (Mitchell, 2008) While foot orthoses are superior to flat inserts for patellofemoral pain, they are similar to physical therapy and do not improve outcomes when added to physical therapy in the short-term management of patellofemoral pain. (Collins, 2008) This study sought to clarify which type of postoperative rehabilitation program patients should undergo after ACL reconstruction surgery, comparing a neuromuscular exercise rehabilitation program with a more traditional strength-training regimen, and it showed comparable long-term primary and secondary outcomes between the 2 groups at 12 and 24 months. On the basis of the study, the authors recommend a combined approach of strength exercises with neuromuscular training in postoperative ACL rehabilitation programs. (Risberg, 2009) This RCT concluded that, after primary total knee arthroplasty, an outpatient physical therapy group achieved a greater range of knee motion than those without, but this was not statistically significant. 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ODG – Physical Medicine Treatment

Recommended. Positive limited evidence. As with any treatment, if there is no improvement after 2-3 weeks the protocol may be modified or re-evaluated. See also specific modalities. (**Philadelphia, 2001**) Acute muscle strains often benefit from daily treatment over a short period, whereas chronic injuries are usually addressed less frequently over an extended period.

ODG – Physical Medicine Treatment

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ODG – Physical Medicine Treatment

Controversy exists about the effectiveness of physical therapy after arthroscopic partial meniscectomy. (**Goodwin, 2003**) A randomized controlled trial of the effectiveness of water-based exercise concluded that group-based exercise in water over 1 year can produce significant reduction in pain and improvement in physical function in adults with lower limb arthritis and may be a useful adjunct in the management of hip and/or knee arthritis. (**Cochrane, 2005**) Functional exercises after hospital discharge for total knee arthroplasty result in a small to moderate short-term, but not long-term, benefit.

ODG – Physical Medicine Treatment

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ODG – Physical Medicine Treatment

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ODG – Physical Medicine Guidelines

ODG Physical Medicine Guidelines

- Allow for fading of treatment frequency (from up to 3 visits per week to 1 or less), plus active self-directed home PT. Also see other general guidelines that apply to all conditions under Physical Therapy in the **ODG Preface**.

Dislocation of knee; Tear of medial/lateral cartilage/meniscus of knee; Dislocation of patella:

- Medical treatment: 9 visits over 8 weeks
- Post-surgical (Meniscectomy): 12 visits over 12 weeks

ODG – Physical Medicine Guidelines

Sprains and strains of knee and leg; Cruciate ligament of knee (ACL tear):

- Medical treatment:
  12 visits over 8 weeks
- Post-surgical (ACL repair):
  24 visits over 16 weeks

MMI – Lower Extremity Case 1

Question for designated doctor:

Has MMI been reached; if so, on what date?

- If not at MMI , why not and what is needed to reach MMI?
- Is this consistent with ODG (including Appendix D)?
- If at MMI, why and what is the date?
- Explain and give rationale for your MMI date
- Complete DWC Form-069 and narrative report

1. Has MMI been reached; if so, on what date?

A. Yes, date of Designated Doctor Exam.
B. Yes, when he returned to work.
C. Yes, date of the visit with the surgeon.
D. No, not at MMI.

Questions about MMI?

Impairment Rating

Impairment Rating Considerations

- Assignment of an impairment rating for the current compensable injury shall be based on the injured employee's condition on the MMI date considering the medical record and the certifying examination.
- Assign one whole body impairment rating for the current compensable injury.
- Explain in your report what you believe the compensable injury to be and the basis for this from the medical records and your exam.

How to Determine Impairment Rating

- Review the medical records prior to your exam.
- Perform a thorough, relevant physical examination of all compensable body areas/systems.
- Correlate with findings in prior medical records.
- Make referrals, if necessary, to answer question.
- Use the rating criteria contained in the appropriate edition of the AMA *Guides to the Evaluation of Permanent Impairment*, 4th Edition.

How to Determine Impairment Rating

- Use the rating criteria contained in the appropriate edition of the AMA *Guides to the Evaluation of Permanent Impairment*.
- **Show your work!** so that "… any knowledgeable person can compare the clinical findings with the guides criteria and determine whether or not the impairment estimates reflect those criteria." AMA *Guides,* page 8
- Document the findings and explain the impairment rating in your narrative report, plus relevant worksheets.
- Complete and sign the DWC Form-069.

Impairment Rating

Question for designated doctor:

On the certified MMI date, what is the impairment rating?

- **Show your work!**

How to Determine Impairment Rating Lower Extremity

- Calculate impairment according to text and tables for each applicable parameter of the 13 possible methods.
- Determine which parameters can be combined.
- Select largest and most clinically appropriate method for each region.

Thirteen (13) Anatomic, Diagnostic, and Functional impairments

1. Limb Length Discrepancy (T. 35, p. 75)
2. Gait Derangement (T. 36, p. 76)
3. Muscle unilateral atrophy (T. 37, p. 77)
4. Muscle strength (T. 38 and 39, p. 77)
5. ROM (T. 40-45, p. 78)
6. Ankylosis (T. 46-61, pp. 79-82)
7. Arthritis aka “DJD” (T. 62, p. 83)
8. Amputation (T. 63, p. 83)

Thirteen (13) Anatomic, Diagnostic, and Functional impairments (continued)

9. Diagnosis Based Estimates – fractures, deformities, dislocations, ligament instability, bursitis, surgical procedures (T. 64, 65, & 66, pp. 85-88)
10. Skin Loss (T. 67, p. 88)
11. Peripheral Nerve Injuries (T. 68, p. 89)
12. Causalgia and RSD/CRPS (p. 89, see p. 56 for UE RSD discussion)
13. Vascular disorders (T. 69, p. 89)

LE Cross Usage Tables

- Grid from Casebook p. 126 /Newsletter Jan/Feb 1998 and later Table 17-2 from the *Guides* 5th Edition.
- Not adopted for use in the DWC system.
- Is not authoritative.
- Do not cite in your report or LOC response.
- Refer to the appropriate portions of the *Guides* and **explain your rationale!**

Lower Extremity Impairment Rating Concepts

- **Anatomic, diagnostic and functional methods (p. 75)**
- **"In general, only one evaluation method should be used to evaluate a specific impairment." *(p. 75)***
- ***"The physician, in general, should decide which estimate best describes the situation and should use only on approach for each anatomic part." (p. 84)***

Lower Extremity Impairment Rating Concepts

- "There may be instances in which elements from both diagnostic and examination approaches will apply to a specific situation. A patient with an acetabular fracture and a sciatic nerve palsy should have estimates for both the hip joint impairment and the nerve palsy. The estimates for the fracture and the nerve condition should be *combined*…" (p. 84)
- "If there were an associated nerve palsy, which does not usually occur with a fracture, the fracture and nerve palsy impairment percents reflecting impairments of different organ systems, would be *combined*… because they involve different organ systems." (p. 84)

Lower Extremity Impairment Rating Concepts

- Combine arthritis and intra-articular fractures (Diagnosis Based Estimates or DBE) - see instructions p. 82 and p. 84.
- Don’t combine ROM and DBE
  - In general use one method – pp. 75 and 84
  - Use “whichever is greater” – p. 84 (twice)

Lower Extremity Impairment Rating Concepts

- Don't combine ROM and atrophy- see p. 78 Comment: "…If the impairment is estimated on the basis of ankle and toe loss of motion, it should not be estimated on the basis of muscle atrophy also."
- Don't combine DBE and atrophy – see p. 84 "Comment: "…The expected muscle weakness or atrophy is included in the diagnosis related estimates…"

How to Determine Impairment Rating Lower Extremity

- If the patient has several impairments of the same lower extremity part, such as the leg or impairments of different parts, such as the ankle and a toe, the whole-person estimates for the impairments are combined.
- If both extremities are impaired, the impairment of each should be evaluated and expressed in terms of the whole person, and the two percents should be combined.
- Combined Values Chart, p. 322, 4th Edition of the AMA *Guides*.

Combined Values Chart

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45	46	46	47	47	48	48	49	49	50	51	51	52	52	53	53	54	54	55	55	56	57	57	58	58	59	59	60	60	61	62	62	63	63	64	64	65	65	66	66	67	68	68	69	69	70
46	47	47	48	48	49	49	50	50	51	51	52	52	53	54	54	55	55	56	56	57	57	58	58	59	60	60	61	61	62	62	63	63	64	64	65	65	66	67	67	68	68	69	69	70	70
47	48	48	49	49	50	50	51	51	52	52	53	53	54	54	55	55	56	57	57	58	58	59	59	60	60	61	61	62	62	63	63	64	64	65	66	66	67	67	68	68	69	69	70	70	71
48	49	49	50	50	51	51	52	52	53	53	54	54	55	55	56	56	57	57	58	58	59	59	60	60	61	62	62	63	63	64	64	65	65	66	66	67	67	68	68	69	69	70	70	71	71
49	50	50	51	51	52	52	53	53	54	54	55	55	56	56	57	57	58	58	59	59	60	60	61	61	62	62	63	63	64	64	65	65	66	66	67	67	68	68	69	69	70	70	71	71	72
50	51	51	52	52	53	53	54	54	55	55	56	56	57	57	58	58	59	59	60	60	61	61	62	62	63	63	64	64	65	65	66	66	67	67	68	68	69	69	70	70	71	71	72	72	73
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**

The values are derived from the formula A+B (1–A)=*combined* value of A and B, where A and B are the decimal equivalents of the impairment ratings. In the chart all values are expressed as percents. To *combine* any two impairment values, locate the larger of the values on the side of the chart and read along that row until you come to the column indicated by the smaller value at the bottom of the chart. At the intersection of the row and the column is the combined value.

For example, to combine 35% and 20% read down the side of the chart until you come to the larger value, 35%. Then read across the 35% row until you come to the column indicated by 20% at the bottom of the chart. At the intersection of the row and column is the number 48. Therefore, 35% *combined* with 20% is 48%. Due to the construction of this chart, the larger impairment value must be identified at the side of the chart.

If three or more impairment values are to be combined, select any two and find their combined value as above. Then use that value and the third value to locate the combined value of all. This process can be repeated indefinitely, the final value in each instance being the combination of all the previous values. In each step of this process the larger impairment value must be identified at the side of the chart.

Note: If impairments from two or more organ systems are to be *combined* to express a whole-person impairment, each must first be expressed as a whole-person impairment percent.

Lower Extremity Impairment

- All tables show percentages in lower extremity (LE) and whole person (WP).
- Lower extremity = 40% WP but impairment values are expressed and **combined at WP level**, for both same LE part (i.e. ankle), or for different parts of the LE (i.e. ankle and knee).

Lower Extremity Impairment

- The Lower Extremity is weighted at 0.40 or 40% Whole Person.
- Never exceed amputation value – APD 111720.
- Lower Extremity impairments calculated to exceed 40% of the whole person are rated at the amputation value of 40% whole person.

Any Questions About Lower Extremity Impairment Rating Concepts?

The 13 Lower Extremity Impairments

Limb Length Discrepancy

- Absolute only - not relative (i.e. pelvic angulation, knee flexion contracture, indistinct landmarks).
- Tape measure and/or iliac crest level not recommended.
- Teleroentgenography is recommended (scanogram, CT scanogram).
- Must be 2cm or greater to rate >0% – see T. 35, p. 75.

T. 35, P. 75 Impairment from Limb Length Discrepancy

Table 35. Impairment from Limb Length Discrepancy.

Discrepancy (cm)	Whole-person (lower extremity) impairment (%)
0 - 1.9	0
2 - 2.9	2 - 3 (5 - 9)
3 - 3.9	4 - 5 (10 - 14)
4 - 4.9	6 - 7 (15 - 19)
5+	8 (20)

Gait Derangement

- Must be consistent with pathologic findings and have an objective basis.
- Except as otherwise noted, full time derangement that requires dependence on assistive device (p. 75).
- Gait “stands alone” and should not be combined with other LE impairments.

Gait Derangement

- Does not apply to abnormalities based only on subjective factors, such as pain or sudden giving-way, as with, for example, a patient with low back discomfort who chooses to use a cane to ease walking.

Gait Derangement

- ***"Whenever possible, the evaluator should use the more specific methods of those other parts in estimating impairments"*** **(p. 75).**

- **Very rarely used.**

T. 36, P. 76 Lower Limb Impairment from Gait Derangement

Table 36. Lower Limb Impairment from Gait Derangement.

Severity	Patient'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 Trendelenberg sign and moderate to advanced osteoarthritis of hip	10
	c. Same as category **a** or **b** above, but patient requires part-time use of cane *or* crutch for distance walking but not usually at home or in 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	70

Muscle Atrophy (Unilateral)

- Contralateral limb must be normal.
- Neither limb should have varicosities or swelling, etc.).
- Rating based on circumferential measurements.
- **Loss of muscle function is rated by only *one* method (gait, atrophy, manual muscle testing or peripheral nerve injury)** – p. 76.

Table 37. Impairments from Leg Muscle Atrophy.

Difference in circumference (cm)	Impairment degree	Whole-person (lower extremity) impairment (%)
a. Thigh: The circumference is measured 10 cm above the patella with the knee fully extended and the muscles relaxed.		
0 - 0.9	None	0
1 - 1.9	Mild	1 - 2 (3 - 8)
2 - 2.9	Moderate	3 - 4 (8 - 13)
3+	Severe	5 (13)
b. Calf: The maximum circumference on the normal side is compared with the circumference at the same level on the affected side.		
0 - 0.9	None	0
1 - 1.9	Mild	1 - 2 (3 - 8)
2 - 2.9	Moderate	3 - 4 (8 - 13)
3+	Severe	5 (13)

Manual Muscle Testing (MMT)

- Requires two examiners or two occasions by a single examiner.
- Must have consistency of one grade or less on the 0-5 strength grading scheme.
- Is based on the joint involved, not nerve or muscle.
- Pain or fear inhibition contraindicates.
- Rate using T. 38 and 39, p. 77.
- The IR for MMT is of greater significance than atrophy and is the better approach.

Range Of Motion

- If it is clear to the evaluator that a restricted ROM has an organic basis, multiple evaluations are unnecessary.
- If, however, multiple evaluations exist, inconsistency of a grade between the findings of two observers, or on separate occasions by the same observer, makes the results invalid.

Range Of Motion

Example from pp. 77-78 AMA Guides 4th Edition

- A 45-year-old woman sustained a fractured tibia in a crash. Months after the injury, when the residua were stable, she had lost half of the ankle flexion and extension motion, and she had severe, permanent stiffness of all toes.
- Impairment: The woman's whole-person impairments were estimated to be moderate (6%) in terms of ankle motion (T. 42) and severe (T. 45) in terms of toe impairment.
- The two impairments are combined by means of the Combined Values Chart (p.322 AMA Guides).
- The whole person impairment was 8%.

Screen shot of Table 42 from AMA Guides, 4th Edition.

Ankle ROM – Page 78

Table 42. Ankle Motion Impairments.

Motion	Whole-person (lower extremity) [foot] impairment		
	Mild: 3% (7%) [10%]	**Moderate: 6% (15%)** [21%]	**Severe: 12% (30%)** [43%]
Plantar flexion capability	11°- 20°	1°- 10°	None
Flexion contracture	—	10°	20°
Extension	10°- 0° (neutral)	—	—

Toe ROM – T. 45, P. 78

Table 45. Toe Impairments.

Type of impairment	Whole-person (lower extremity) [foot] impairment	
	Mild: 1% (2%) [3%]	**Moderate and severe: 2% (5%) [7%]**
Great toe		
Metatarsophalangeal, extension	15°- 30°	Less than 15°
Interphalangeal, flexion	Less than 20°	—
Lesser toes		
Metatarsophalangeal, extension	Less than 10°	—

*The maximum whole-person impairment percent for impairments of 2 or more lesser toes of one foot is 2%.

Lower Extremity ROM Tables

Historical Perspective:

- Rate the most severe loss of ROM in a table, with a single value e.g. Mild, Moderate or Severe for each table. Don't add motion arcs within the same table.
- See example pp. 77-78 *Guides.*
- "In the lower extremity when there is diminished joint motion in more than 1 direction, only the most severe deficit is rated. Unlike upper extremity joints, the examiner does not add the ratings for each motion deficit." p. 130 *Guides Casebook.*

Lower Extremity ROM Tables

Appeals Panel Decision 110741 (filed 7/25/11)

- "Section 3.2e does not require that a certifying doctor must only use the most severe impairment for an individual direction of motion within the same table (Table 40 through 43)."
- "There is no provision in the Act or Rules that adopts the AMA Guides Casebook to determine the existence and degree of an employee's impairment."
- "There is no specific provision in the AMA Guides in the Lower Extremity section that restricts ROM deficits in multiple directions…"

Lower Extremity ROM Tables

Conclusion:

- *Guides* 4th Edition does not clearly address issue.

- Casebook to 4th clarified to rate the most severe loss.

- *Guides* 5th Edition instructs - “Range of motion restrictions in multiple directions do increase the *impairment*. *Add* range of motion impairments for
  a single joint to determine the total joint range of motion impairment.”

Lower Extremity ROM Tables

Conclusion (continued):

- There is no provision in the DWC Act or Rules that adopts the AMA *Guides* Casebook(s) or the AMA *Guides* 5th Edition.
- Within the discretion of the certifying doctor.
- Impairment rating should be clinically appropriate.

- **SHOW YOUR WORK!** – describe how you calculated the IR and why you chose the method you used.

Ankylosis

- Used when there is ankylosis (absolute loss of joint motion) with malposition.
- Rarely used - surgical correction is preferable to ankylosis with malposition.
- Impairment percentages in Tables 46-61 list values for ankylosis in non-neutral positions.
- Add these values to those for the optimal position, as listed in the text.

Ankylosis

- If ankylosis is present in several planes, add the % for the first plane to the % for the neutral position and then combine the % for second plane. See ankle example on p. 81.
- Use Tables 46-61, pp. 79-82 and related text for optimal position description.
- Do not exceed the amputation value.

Arthritis

- For most patients, X-ray grading is a more objective and valid method for assigning impairment estimates than physical findings, such as the ROM or joint crepitation.
- Arthritis rated with measurement of cartilage interval per X-ray.
- X-ray positioning very important (patient standing if possible, 36 inch tube distance, etc.) – see *Guides* pp. 82-83.

Arthritis

- Intra-articular fractures with rapid onset arthritis are combined with Diagnosis Based Estimate - *Guides* pp. 84-86.
- Patellofemoral pain and crepitation from direct trauma = 2% WP per caption on T. 62, P. 83.
- Rate using T. 62, P. 83.

Arthritis and ROM (p. 82)

- “Range of motion techniques are of limited value for estimating impairment secondary to arthritis.”
- “Impairments of patient with flexion contractures should be estimated according to range of motion findings.”
- “If there is a doubt or controversy about the suitability of a specific patient for this rating method, range of motion techniques may be used.”

Amputation

- Based on bony amputation.
- Rate amputation per T. 63, P. 83.
- Amputation secondary to peripheral vascular disease is combined with the rating for vascular disease (T. 69, P. 89).

Amputations

Table 63. Impairment Estimates for Amputations.

Amputation	Whole-person (lower extremity) [foot] impairment (%)		
Hemipelvectomy	50		
Hip disarticulation	40	(100)	
Above knee			
Proximal	40	(100)	
Midthigh	36	(90)	
Distal	32	(80)	
Knee disarticulation	32	(80)	
Below knee			
less than 3 inches	32	(80)	
3 inches or more	28	(70)	
Syme (foot)	25	(62)	[100]
Midfoot	18	(45)	[64]
Transmetatarsal	16	(40)	[57]
First metatarsal	8	(20)	[28]
Other metatarsals	2	(5)	[7]
All toes at metatarso-phangeal (MTP) joint	9	(22)	[31]
Great toe at MTP joint	5	(12)	[17]
Great toe at interphalangeal joint	2	(5)	[7]
Lesser toes at MTP joint	1	(2)	[3] each

Diagnosis-based Estimates

- Some impairment estimates are assigned more appropriately on the basis of diagnosis than on the basis of findings on physical examination.
- A good example is that of a patient impaired because of the replacement of a hip, which was successful.
- This patient may be able to function well but may require prophylactic restrictions, a further impairment.
- For most diagnosis-based estimates, the ranges of impairments are broad, and the estimate will depend on the clinical manifestations.

Diagnosis-based Estimates

- The evaluating physician must determine whether diagnostic or examination criteria best describe the impairment of a specific patient.
- ***The physician, in general, should describe which estimate best describes the situation and should use only one approach for each anatomic part.***

Diagnosis-based Estimates

- There may be instances in which elements from both diagnostic and examination approaches will apply to a specific situation.
- A patient with an acetabular fracture and a sciatic nerve palsy should have estimates made for both the hip joint impairment and the nerve palsy.
- The estimates for the fracture and the nerve condition would be combined (different organ systems).

Diagnosis-based Estimates

- The final lower extremity impairment must not exceed the impairment estimate for amputation of the extremity, 100%, or 40% whole-person impairment.
- Fractures in and about the joints with degenerative changes should be rated either by using the DBE section and combining the rating for arthritic degeneration or by using the ROM section (also see arthritis section pp. 82-83).
- It is recommended that the section providing the greater impairment estimate be used.

Any Questions About the 13 Methods?

MMI/IR Lower Extremity Case 1 (The Sequel)

Designated Doctor Medical History

- The injured worker returns to see you for a subsequent DDE 5 months later (36 weeks post-injury) after his right knee partial medial meniscectomy and ACL reconstruction.

MMI/IR – Lower Extremity Case 1 (The Sequel)

Designated Doctor Medical History

- He completed 24 physical therapy visits and returned to full duty work one month ago (32 weeks post-injury).
- PT discharge records document 5/5 right LE strength, full extension, and 135 degrees of flexion.

MMI/IR – Lower Extremity Case 1 (The Sequel)

Designated Doctor Medical History

- He is back to work as a landscaper without any problems and reports minimal pain mostly over the patellar tendon graft site when kneeling, which he rates as a “1/10.”

MMI/IR – Lower Extremity Case 1 (The Sequel)

Designated Doctor Exam (36 weeks post-injury)

- Well-healed surgical scars.
- No right knee swelling or effusion
- No weakness to right quad set, manual muscle testing shows 5/5 strength to right knee flexion and extension

MMI/IR – Lower Extremity Case 1 (The Sequel)

Designated Doctor Exam (36 weeks post-injury)

- Mildly positive anterior drawer and 1+ Lachman‘s
- No atrophy with both right and left thigh circumference measuring 53 cm.
- Right knee ROM of extension of 0 degrees and flexion of 140 degrees.

MMI/IR - Lower Extremity Case 1 (The Sequel)

Designated Doctor Physical Examination

- Based on the medical records and your physical examination of the injured employee, what is the compensable injury for certifying MMI and IR?

Lower Extremity Case 1 (The Sequel)

Question for designated doctor:

Has MMI been reached; if so, on what date?

If not at MMI , why not and what is needed to reach MMI? Is this consistent with ODG (including Appendix D)?

- If at MMI, why and what is the date?
- Explain and give rationale for your MMI date.
- Complete DWC Form-069 and narrative report.

2. Has MMI been reached; if so, on what date?

A. Yes, 32 weeks post injury.

B. Yes, 36 weeks post injury.

C. No, not at MMI.

MMI/Impairment Rating Lower Extremity Case 1 (the sequel)

Question for designated doctor:

On the certified MMI date, what is the whole person impairment rating?

- **Show Your Work!**

3. On the Date of MMI, what is the whole person IR?

A. 0%
B. 1%
C. 3%
D. 4%

Which of the 13 Methods Apply?

- ROM
- Diagnosis Based Estimate (DBE)

Table 41. Knee Impairment.

Motion	Whole-person (lower extremity) impairment (%)		
	Mild: 4% (10%)	**Moderate: 8% (20%)**	**Severe: 14% (35%)**
Flexion	Less than 110°	Less than 80°	Less than 60° +1% (2%) per 10° less than 60°
Flexion contracture	5°-9°	10°-19°	20°+
Deformity measured by femoral-tibial angle; 3° to 10° valgus is considered normal			
Varus	2° valgus-0° (neutral)	1°-7° varus	8°-12° varus; add 1% (2%) per 2° over 12°
Valgus	10°-12°	13°-15°	16°-20°; add 1% (2%) per 2° over 20°

T. 64,
p. 85

Region and condition	Whole-person (lower extremity) impairment (%)
Knee	
Patellar subluxation or dislocation with residual instability	3 (7)
Patellar fracture	
Undisplaced, healed	3 (7)
Articular surface displaced more than 3 mm	5 (12)
Displaced with nonunion	7 (17)
Patellectomy	
Partial	3 (7)
Total	9 (22)
Meniscectomy, medial *or* lateral	
Partial	1 (2)
Total	3 (7)
Meniscectomy, medial *and* lateral	
Partial	4 (10)
Total	9 (22)
Cruciate *or* collateral ligament laxity	
Mild	3 (7)
Moderate	7 (17)
Severe	10 (25)
Cruciate *and* collateral ligament laxity	
Moderate	10 (25)
Severe	15 (37)

What is the IR?

- ROM = 0%
- DBE = 4% WP
  - 1% WP from partial medial menisectomy
  - 3% WP for mild anterior cruciate laxity
  - Combine two “anatomic parts” per *Guides* p.84 (also see *Casebook* p. 134)
- Can you combine ROM and DBE?
- Total IR = 4% WP

MMI/IR – Lower Extremity Case 1 (additional scenario 1)

Designated Doctor Exam at MMI:

- ROM is 0 degrees extension and 105 degrees of flexion.
- McMurray's is negative
- No cruciate ligament laxity

- **What is the whole person IR?**

4. On the Date of MMI, what is the whole person IR?

A. 0%
B. 1%
C. 3%
D. 4%

What is the whole person IR?

- ROM = 4% WP
- DBE = 1% WP
  (for partial medial meniscectomy)
- Can you combine ROM and DBE?

- Total IR = 4% WP
  (use larger value - p. 84)

MMI/IR – Lower Extremity Case 1 (additional scenario 2)

Designated Doctor Exam at MMI

- ROM is 0 degrees extension and 130 degrees flexion
- No cruciate ligament laxity
- The DD notes that the operative note describes the surgical procedure as ***"arthroscopic medial meniscus repair and ACL reconstruction"***

- **What is the whole person IR?**

What is the whole person IR?

- ROM = 0%
- DBE = 0%
  (no impairment rating for meniscal repair)

- Total IR = 0% WP

Questions?

MMI/IR – Lower Extremity Case 2

- An IE had a work-related injury that resulted in a left total knee replacement.
- When seen for DDE, he is determined to be at MMI.
- Physical exam shows:
  - Occasional pain with stairs only
  - No A-P instability, 5^{o} of M-L instability
  - Flexion contracture 5^{o} and extension lag 8^{o}
  - Alignment 7^{o}
  - ROM minus 8^{o} extension and flexion 85^{o}

5. On the Date of MMI, what is the whole person IR?

A. 20%
B. 30%
C. 40%
D. 50%

Rating Knee Replacement Results, T.66, p. 88

Table 66. Rating Knee Replacement Results:*

	No. of points
a. Pain	
None	50
Mild or occasional	45
Stairs only	40
Walking and stairs	30
Moderate	
Occasional	20
Continual	10
Severe	0
b. Range of motion	
Add 1 point per 5°	25
c. Stability	
(maximum movement in any position)	
Anteroposterior	
<5 mm	10
5-9 mm	5
>9 mm	0
Mediolateral	
5°	15
6°-9°	10
10°-14°	5
≥15°	0
Subtotal	
d. Deductions (minus)	
Flexion contracture	
5°-9°	2
10°-15°	5
16°-20°	10
>20°	20
e. Extension lag	
<10°	5
10°-20°	10
>20°	15
f. Alignment	
0°-4°	0
5°-10°	3 points per degree
11°-15°	3 points per degree
>15°	20
Deductions subtotal	—

*The point total for estimating knee replacement results is the sum of the points in categories a, b, and c minus the sum of the points in categories d, e, and f. Modified from ref. 44.

- Pain = 40 points
- ROM = 15 points (77º/5 º) – note max 25 points (125º)
- Stability = 25 points (AP nl =10 pts + ML 5º = 15)
- Flexion contracture 5º = 2 points
- Extension lag of 8º=5 points
- Alignment 7º=9 points
- (a+b+c) – (d+e+f)
- (40+15+25)=80; (2+5+9)=16
- 80-16=64 points
- 64 points – T. 64 p. 85
- Fair Result = 20% WP

Best Practice - ROM

1 point per 5°

ROM of 125° = 25 points (maximum value)

Flexion contracture vs. Extension lag

- Flexion contracture = Fixed = Passive ROM
- Knee can’t be fully extended either actively or passively
- Extension lag = not fixed=Active ROM
- Knee can’t be fully extended actively, but passively, more extension is possible

Best Practice - Alignment

- $0^{o} – 4^{o}$ = 0 points
- $5^{o} – 15^{o}$ = 3 points per degree
- > 15^{o} = add 20 points

Best Practice - Alignment

5° = 3 points	11° = 21 points
6° = 6 points	12° = 24 points
7° = 9 points	13° = 27 points
8° = 12 points	14° = 30 points
9° = 15 points	15° = 33 points
10° = 18 points	>15 °= 53 points

Total Hip Replacement – T. 64, P. 85

Hip	
Total hip replacement; includes endoprosthesis, unipolar or bipolar	
Good result, 85-100 points*	15 (37)
Fair result, 50-84 points*	20 (50)
Poor result, less than 50 points*	30 (75)

Total Hip Replacement – T. 65, P. 85

Table 65. Rating Hip Replacement Results.*

	No. of points
a. Pain	
None	44
Slight	40
Moderate, occasional	30
Moderate	20
Marked	10

Total Hip Replacement – T. 65, P. 85

b. Function	
Limp	
None	11
Slight	8
Moderate	5
Severe	0
Supportive device	
None	11
Cane for long walks	7
Cane	5
One crutch	3
Two canes	2
Two crutches	0
Distance walked	
Unlimited	11
Six blocks	8
Three blocks	5
Indoors	2
In bed or chair	0

Total Hip Replacement – T. 65, P. 85

c. Activities	
Stairs climbing	
Normal	4
Using railing	2
Cannot climb readily	1
Unable to climb	0
Putting on shoes and socks	
With ease	4
With difficulty	2
Unable to do	0
Sitting	
Any chair, 1 hour	4
High chair	2
Unable to sit comfortably	0
Public transportation	
Able to use	1
Unable to use	0

Total Hip Replacement – T. 65, P. 85

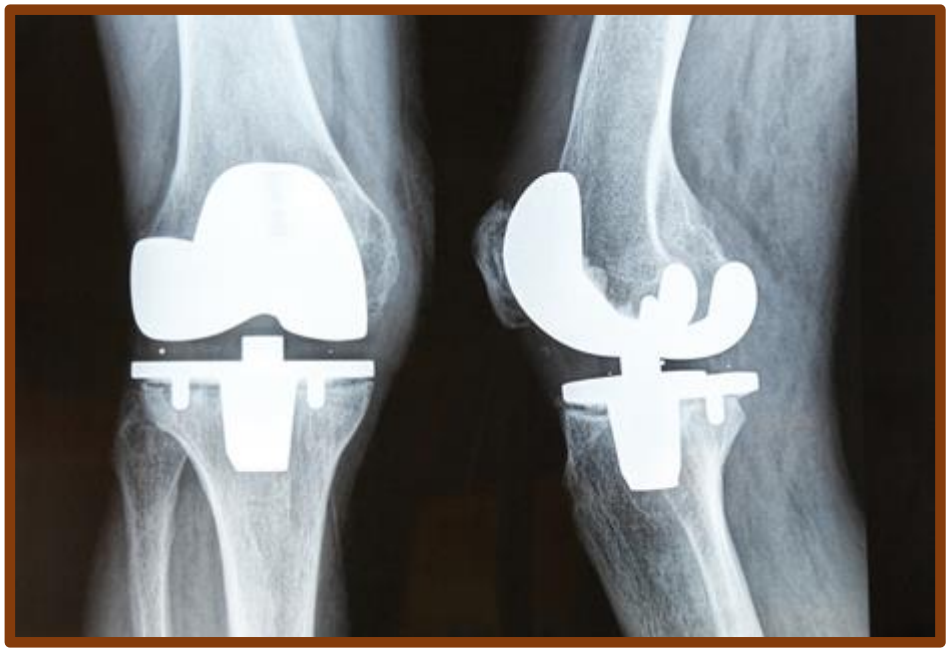
d. Deformity	
Fixed adduction	
<10°	1
≥10°	0
Fixed internal rotation	
<10°	1
≥10°	0
Fixed external rotation	
<10°	1
≥10°	0
Flexion contracture	
<15°	1
≥15°	0
Leg length discrepancy	
<1.5 cm	1
≥1.5 cm	0

Total Hip Replacement – T. 65

e. Range of Motion	
Flexion	
>90°	1
≤90°	0
Abduction	
>15°	1
≤15°	0
Adduction	
>15°	1
≤15°	0
External rotation	
>30°	1
≤30°	0
Internal rotation	
>15°	1
≤15°	0

*Add the points from categories a, b, c, d, and e to determine the total and characterize the result of replacement. Source: modified from refs. 42 and 43.

Questions?



MMI/IR – Lower Extremity Case 3

History of Injury

- A 25-year-old data entry clerk was involved in a frontal impact motor vehicle, injuring his left leg.

MMI/IR – Lower Extremity Case 3

Treatment History

- He was seen in the ER where x-rays showed a trimalleolar fracture of his left ankle.
- He was taken to the OR where he had an ORIF of the left ankle.
- Post-operatively, he was noted to have some continued left knee pain and swelling.

MMI/IR – Lower Extremity Case 3

Treatment History

- An MRI scan of the left knee was obtained and showed an undisplaced tibial plateau fracture.
- His orthopaedic surgeon recommended non-operative treatment with cast-brace immobilization and non-weight-bearing.

MMI/IR - Lower Extremity Case 3

Treatment History

- He underwent 25 visits of physical therapy for both the knee and ankle over 4 months.
- Follow-up x-rays of the ankle and the knee showed healed fractures without displacement.

MMI/IR - Lower Extremity Case 3

Treatment History

- 30 weeks post injury
- PT notes:
  - Performing resisted left knee flexion/extension ankle flexion/extension, and eversion/inversion exercises.
  - 5/5 strength bilateral knee flexion/extension, ankle flexion/extension, and eversion/inversion.
  - Ankle ROM mildly decreased.
  - Full knee ROM.
  - Discharged to his home exercise program, follow-up with treating doctor.
- Treating Doctor documents “doing well, has progressed with PT, released to RTW as a data entry clerk without restrictions, follow-up prn.”

MMI/IR - Lower Extremity Case 3

Treatment History

- He has been able to continue working with these restrictions and states he can walk and perform his daily activities without much difficulty.

MMI/IR - Lower Extremity Case 3

The Designated Doctor Medical History
9 months (36 weeks) post injury

- Chief complaint - left knee and ankle pain “3-4/10.”
- Working full time with restrictions (last 6 weeks).

MMI/IR - Lower Extremity Case 3

Designated Doctor Physical Examination

- Physical examination shows:
- VITALS: Height 66 inches, Weight 140 lbs, BP 120/78, Pulse 64, Respiration 14.
- Pleasant affect. Cooperative with history and examination. Oriented to time, person and place, with normal attention span and concentration.

MMI/IR - Lower Extremity Case 3

Designated Doctor Physical Examination

- Healed surgical scars left ankle.
- He ambulates with decreased stance and push-off phase left leg. Does not require the use of an assistive device to walk.
- There is 1 cm of left calf atrophy and bilaterally symmetric thigh circumference.

MMI/IR - Lower Extremity Case 3

Designated Doctor Physical Examination

- Normal lower extremity sensation.
- Plantar flexion is 15° and dorsiflexion is 8°. Inversion is 15° and eversion is 10°.
- Left knee range of motion is 120° flexion and 0° extension.
- Manual muscle testing shows 5/5 strength of ankle plantar flexion, dorsiflexion, inversion and eversion, knee flexion and extension.

MMI/IR - Lower Extremity Case 3

Designated Doctor Physical Examination

- Based on the medical records and your physical examination of the injured employee, what is the compensable injury for certifying MMI and IR?

MMI/IR - Lower Extremity Case 3

Question for designated doctor:

Has MMI been reached; if so, on what date?

If not at MMI, why not and what is needed to reach MMI?

Is this consistent with ODG (including Appendix D)?

- If at MMI, why and what is the date?
- Explain and give rationale for your MMI date.
- Complete DWC Form-069 and narrative report.

MMI/IR - Lower Extremity Case 3

Question for designated doctor:

On the certified MMI date, what is the whole person impairment rating?

- **Show Your Work!**

6. On the Date of MMI, what is the whole person IR?

A. 2%

B. 3%

C. 6%

D. More than one correct answer, show your work.

Which of the 13 Methods Apply?

- **Atrophy**
- **ROM**
  - Ankle: Plantar flexion is 15° and dorsiflexion is 8°.
  - Hindfoot : Inversion is 15° and eversion is 10°.
  - Left knee range of motion is 115° flexion and 0° extension.
  - Other? DBE?
- Can you combine atrophy and ROM? See p. 78.

Combine IR for Each Part of the LE

"If the patient has several impairments of the same lower part, such as the leg, or impairments of different anatomic parts,
such as the ankle and a toe, the whole person estimates as **combined**

(Combined Values Chart, p. 322)."
Section 3.2 p. 75

Lower Extremity MMI/IR Case 3

- Don't combine ROM and atrophy- see p. 78 Comment: "…If the impairment is estimated on the basis of ankle and toe loss of motion, it should not be estimated on the basis of muscle atrophy also."
- Don't combine DBE and atrophy – see p. 84 "Comment: "…The expected muscle weakness or atrophy is included in the diagnosis related estimates…"
- Don't combine ROM and DBE – see p. 75 and 84 – in general use only 1 method. Also see Comment p 84 example of different organ systems

Text from p. 78

of the leg muscles. If the impairment is estimated on the basis of ankle and toe loss of motion, it should not be estimated on the basis of muscle atrophy also.

Text from p. 84

Comment: Impairment due to malunion of a fracture should be estimated according to the diagnosis. The expected muscle weakness or atrophy is included in the diagnosis-related estimates, but shortening is a different impairment.

Text from p. 75

In general, only one evaluation method should be used to evaluate a specific impairment. In some instances, however, as with the example on p. 77, a combination of two or three methods may be required.

Text from p. 84

The final lower extremity impairment must not exceed the impairment estimate for amputation of the extremity, 100%, or 40% whole-person impairment.

Ankle ROM – Page 78

Table 42. Ankle Motion Impairments.

Motion	Whole-person (lower extremity) [foot] impairment		
	Mild: 3% (7%) [10%]	**Moderate: 6% (15%)** [21%]	**Severe: 12% (30%)** [43%]
Plantar flexion capability	11°- 20°	1°- 10°	None
Flexion contracture	—	10°	20°
Extension	10°- 0° (neutral)	—	—

Hindfoot ROM / Deformity Page 78

Table 43. Hindfoot Impairments.

Motion	Whole-person (lower extremity) [foot] impairment	
	Mild: 1% (2%) [3%]	**Moderate and severe: 2% (5%) [7%]**
Inversion	10°-20°	0°-9°
Eversion	0°-10°	—

Table 41. Knee Impairment.

Motion	Whole-person (lower extremity) impairment (%)		
	Mild: 4% (10%)	**Moderate: 8% (20%)**	**Severe: 14% (35%)**
Flexion	Less than 110°	Less than 80°	Less than 60° +1% (2%) per 10° less than 60°
Flexion contracture	5°-9°	10°-19°	20°+
Deformity measured by femoral-tibial angle; 3° to 10° valgus is considered normal			
Varus	2° valgus-0° (neutral)	1°-7° varus	8°-12° varus; add 1% (2%) per 2° over 12°
Valgus	10°-12°	13°-15°	16°-20°; add 1% (2%) per 2° over 20°

What is the ROM IR?

2 methods (per APD 110741)

Ankle

- **Single largest value method**
  - Ankle = 3% WP
- **Adding more than one motion loss in a joint**
  - Ankle = 3% WP + 3% WP = 6% WP

What is the ROM IR?

2 methods (per APD 110741)

Hindfoot

- **Single largest value method**
  - Hindfoot = 1% WP
- **Adding more than one motion loss in a joint**
  - Hindfoot = 1% WP + 1% WP = 2% WP

What is the ROM IR?

2 methods (per APD 110741)

- **Single largest value method**
  - Ankle = 3% WP
  - Hindfoot = 1% WP
  - Knee = 0%

What is the ROM IR?

2 methods (per APD 110741)

- **Adding more than one motion loss in a joint**
  - Ankle = 3% WP + 3% WP = 6% WP
  - Hindfoot = 1% WP + 1% WP = 2% WP
  - Knee = 0%

What is the ROM IR?

2 methods (per APD 110741)

- **Which method is more clinically relevant in this case?**

- "Show your work!" – explain the method you used and the rationale for its use.

Table 37. Impairments from Leg Muscle Atrophy.

Difference in circumference (cm)	Impairment degree	Whole-person (lower extremity) impairment (%)
a. Thigh: The circumference is measured 10 cm above the patella with the knee fully extended and the muscles relaxed.		
0 - 0.9	None	0
1 - 1.9	Mild	1 - 2 (3 - 8)
2 - 2.9	Moderate	3 - 4 (8 - 13)
3+	Severe	5 (13)
b. Calf: The maximum circumference on the normal side is compared with the circumference at the same level on the affected side.		
0 - 0.9	None	0
1 - 1.9	Mild	1 - 2 (3 - 8)
2 - 2.9	Moderate	3 - 4 (8 - 13)
3+	Severe	5 (13)

What is the Ankle IR?

Ankle

ROM

- Single largest value method = 3% WP
- Adding more than one motion loss in a joint = 6% WP

Atrophy

- Can’t combine atrophy and ROM (p.78)

What is the Ankle IR?

Ankle

DBE

- None – x-rays show healed without displacement. See p.86.
- If there was DBE could you combine DBE and ROM?

Select "the greater" IR (per p. 84)

- DBE = none
- ROM = 3% WP or 6% WP, depending on method used.

Ankle IR = 3% WP or 6% WP, depending on method used

What is the Hindfoot IR?

Hindfoot

DBE

- None – x-rays show healed without displacement. See p.86.
- If there was DBE could you combine DBE and ROM?

Select "the greater" IR (per p. 84)

- DBE = none
- ROM = 1% WP or 2% WP, depending on method used.

Hindfoot IR = 1% WP or 2% WP, depending on method used

What is the Knee IR?

Knee

DBE

- Knee = 2% WP (undisplaced tibial plateau fracture p.85)
- Can you combine DBE and ROM?

Select "the greater" IR (per p. 84)

- DBE = 2% WP
- ROM = 0%

- **Knee IR = 2%**

What is the Total LE IR?

- **Ankle IR = 3% WP or 6% WP, depending on method used**
- **Hindfoot IR = 1% WP or 2% WP, depending on method used**
- **Knee IR = 2%**
- **Combine WP values for ankle (3% or 6%) with Knee (2%) with Hindfoot (1% or 2%)**

Questions?

Skin Loss

- Full-thickness skin loss about certain areas in the lower extremity results in significant impairment.
- Rate even when the areas are successfully covered with an appropriate form of skin graft.
- Rate using T. 67, p. 88.

Peripheral Nerve Injuries

- Divided into three categories:

  Motor Deficits, Sensory Deficits, Dysesthesia or disordered sensation.

- All estimates listed in T. 68, are for **complete** motor or sensory loss for the named peripheral nerves. Also see APD 101481.

- Motor, sensory and dysesthesia estimates should be combined.

- Partial motor loss is rated on basis of manual muscle testing per Section 3.2d, p. 76.

Peripheral Nerve Injures

- Sensory deficits and dysesthesias are subjective and must be carefully evaluated.
- Ideally, two examiners should agree.
- Estimates for peripheral nerve impairments may be combined with those for other types of lower extremity impairments, except those for muscle weakness and atrophy, using the Combined Values Chart.
- Loss of muscle function is rated by only one method (gait, atrophy, manual muscle testing or peripheral nerve injury) – p. 76.
- LE sensory and motor nerves shown on Figures 59 and 60, p. 93.

Impairments from Nerve Deficits

T. 68, p. 89

Table 68. Impairments from Nerve Deficits.

	Whole-person (lower extremity) [foot] impairment (%)		
Nerve	**Motor**	**Sensory**	**Dysesthesia**
Femoral	15 (37)	1 (2)	3 (7)
Obturator	3 (7)	0	0
Superior gluteal	25 (62)	0	0
Inferior gluteal	15 (37)	0	0
Lateral femoral cutaneous	0	1 (2)	3 (7)
Sciatic	30 (75)	7 (17)	5 (12)
Common peroneal	15 (42)	2 (5)	2 (5)
Superficial peroneal	0	2 (5)	2 (5)
Sural	0	1 (2)	2 (5)
Medial plantar	2 (5) [7]	2 (5) [7]	2 (5) [7]
Lateral plantar	2 (5) [7]	2 (5) [7]	2 (5) [7]

Peripheral Nerve Injures

- **Chapter 3**, The Musculoskeletal System, p. 89
  - partial motor loss is rated on basis of manual muscle testing per Section 3.2d, p. 76 and p. 77.
  - does not address partial sensory loss.

- **Chapter 4**, The Nervous System, pp. 150-151
  - similar to UE methodology.
  - consider this section for partial motor and sensory nerve loss, in those relatively rare cases where applicable.

Peripheral Nerve Injures

- Chapter 4 Method for Determination of Partial Loss:
  - Determine appropriate peripheral nerve involved.
  - Take WP value from **Chapter 3, T. 68, p. 89** for **complete** motor or sensory loss.
  - **Multiply value for complete motor loss** (T. 68) by the **grade of the partial loss for motor deficit** (Chapter 4, T. 21, p. 151).
  - **Multiply value for complete sensory loss** (T. 68) by the **grade of the partial loss for sensory deficit** (Chapter 4, T. 20, p. 151).
  - Combine partial motor % WP with partial sensory % WP (p.322, Combined Values Chart).

Impairments from Nerve Deficits
T. 68, P. 89

Table 68. Impairments from Nerve Deficits.

	Whole-person (lower extremity) [foot] impairment (%)		
Nerve	**Motor**	**Sensory**	**Dysesthesia**
Femoral	15 (37)	1 (2)	3 (7)
Obturator	3 (7)	0	0
Superior gluteal	25 (62)	0	0
Inferior gluteal	15 (37)	0	0
Lateral femoral cutaneous	0	1 (2)	3 (7)
Sciatic	30 (75)	7 (17)	5 (12)
Common peroneal	15 (42)	2 (5)	2 (5)
Superficial peroneal	0	2 (5)	2 (5)
Sural	0	1 (2)	2 (5)
Medial plantar	2 (5) [7]	2 (5) [7]	2 (5) [7]
Lateral plantar	2 (5) [7]	2 (5) [7]	2 (5) [7]

Chapter 4 – T. 20 and 21, P. 59

Table 20. Classification and Procedure for Determining Impairment Due to Pain or Sensory Deficit Resulting from Peripheral Nerve Disorders.

a. Classification

Class	Description of sensory loss or pain	% Sensory impairment
1	No loss of sensation, abnormal sensation, or pain	0
2	Normal sensation except for pain, or decreased sensation with or without pain, forgotten during activity	1 - 25
3	Decreased sensation with or without pain, interfering with activity	26 - 60
4	Decreased sensation with or without pain or minor causalgia that may prevent activity	61 - 80
5	Decreased sensation with severe pain or major causalgia that prevents activity	81 - 95

b. Procedure

1. Identify the area of involvement, using the dermatome charts in Chapter 3 (pp. 50 and 52).
2. Identify the nerve, part of plexus, or root that innervates the area.
3. Find the value for maximum loss of function of the specific nerve or root due to pain or loss of sensation, using the appropriate table in the *Guides* chapter on the musculoskeletal system (Chapter 3, p. 13).
   Use Table 13 (p. 51) for the cervical roots; Table 14 (p. 52) for the brachial plexus; Table 15 (p. 54) for upper extremity nerves; Table 83 (p. 130) for the lumbosacral roots; and Table 68 (p. 89) for the lower extremity nerves.
4. Grade the degree of decreased sensation or pain according to the classification given above.
5. Multiply the percentage associated with the nerve identified in procedure 3 (above) by the percentage associated with the decreased sensation.
6. Determine other nerve impairments by the same procedure; *combine* the impairments using the Combined Values Chart (p. 322) to determine the whole-person impairment of the nervous system.

Table 21. Classification and Procedure for Determining Nervous System Impairment Due to Loss of Muscle Power and Motor Function Resulting from Peripheral Nerve Disorders.

a. Classification

Grade	Description of muscle function	% Motor deficit
5	Active movement against gravity with full resistance	0
4	Active movement against gravity with some resistance	1 - 25
3	Active movement against gravity only, without resistance	26 - 50
2	Active movement with gravity eliminated	51 - 75
1	Slight contraction and no movement	76 - 99
0	No contraction	100

b. Procedure

1. Identify the motion involved, such as flexion or extension.
2. Identify the muscle(s) performing the motion and the motor nerve(s) involved.
3. Grade the severity of motor deficit of the individual muscles according to the classification given above.
4. Find the maximum impairment due to the motor deficit for each nerve structure involved, as listed in Chapter 3: upper extremity (Table 15, p. 54), brachial plexus (Table 14, p. 52), lower extremity nerves (Table 68, p. 89); and lumbosacral nerves (Table 83, p. 130).
5. Multiply the severity of the motor deficit by the percentage associated with the nerve(s) identified in procedure 4 (above) to obtain the estimated impairment from strength deficit for each structure involved.

Questions?

Causalgia and Reflex Sympathetic Dystrophy (RSD)

- Causalgia (CRPS Type II) is burning pain due to injury of the peripheral nerve.

- RSD (CRPS Type I) is a disturbance of the sympathetic nervous system characterized by pain, swelling, stiffness, and discoloration, which may follow a sprain, fracture or nerve or blood vessel injury.

Causalgia and RSD

- Rated using the same method as the Upper Extremity, per p. 89.
- See Section 3.1k p. 56 for UE peripheral nerve discussion.
- Combine applicable values for ROM, sensory deficit/pain, motor deficit.

Vascular Disorders

- Amputation secondary to peripheral vascular disease is combined with the rating for vascular disease (T. 69, p. 89).

- Criteria for rating are listed per T. 69, p. 89.

Table 69. Lower Extremity Impairment Due to Peripheral Vascular Disease.

Class 1: (0%-9% impairment)	**Class 2:** (10%-39% impairment)	**Class 3:** (40%-69% impairment)	**Class 4:** (70%-89% impairment)	**Class 5:** (90%-100% impairment)
The patient experiences neither claudication nor pain at rest;	The patient experiences intermittent claudication on walking at least 100 yards at an average pace;	The patient experiences intermittent claudication on walking as few as 25 yards and no more than 100 yards at average pace;	The patient experiences intermittent claudication on walking less than 25 yards, or the patient experiences intermittent pain at rest;	The patient experiences severe and constant pain at rest;
and	**or**	**or**	**or**	**or**
The patient experiences only transient edema;	There is persistent edema of a moderate degree, incompletely controlled by elastic supports;	There is marked edema that is only partially controlled by elastic supports;	The patient has marked edema that cannot be controlled by elastic supports;	There is vascular damage as evidenced by signs such as amputations at or above the ankles of two extremities, or amputation of all digits of two or more extremities, with evidence of persistent vascular disease or of persistent, widespread, or deep ulceration involving two or more extremities
and	**or**	**or**	**or**	
On physical examination, not more than the following findings are present: loss of pulses; minimal loss of subcutaneous tissue; calcification of arteries as detected by roentgenographic examination; asymptomatic dilation of arteries or of veins, not requiring surgery and not resulting in curtailment of activity	There is vascular damage as evidenced by a sign such as a healed, painless stump of an amputated digit showing evidence of persistent vascular disease, or a healed ulcer	There is vascular damage as evidenced by a sign such as healed amputation of two or more digits of one extremity, with evidence of persisting vascular disease or superficial ulceration	There is vascular damage as evidenced by signs such as an amputation at or above an ankle, or amputation of two or more digits of two extremities with evidence of persistent vascular disease, or persistent widespread or deep ulceration involving one extremity	

Pelvis

- **DBE (LE T. 64, P. 85)**
- **Spine (Section 3.4, P. 131)**

Questions?