THE UPPER EXTREMITIES
CHAPTER 16
Pages 433-521

By Marlene Phillips
Bradford & Barthel, LLP

Bradford & Barthel’s Rating and File Consultation Services

“When You Need More Than Just A Rating”
Email - Ratings@bradfordbarthel.com
Marlene Phillips
Ontario Office – (909) 476-0552
Email – mphillips@bradfordbarthel.com
Tim Mussack
Sacramento Office – (916) 569-0790
Email - tmussack@bradfordbarthel.com

www.bradfordbarthel.com
The 10 sections of the upper extremity (UE) chapter:

16.1 Principles of Assessment (p. 434-441)
16.2 Amputations (p. 441-445)
16.3 Sensory Impairment Due to Digital Nerve Lesions (p. 445-450)
16.4 Evaluating Abnormal Motion (p. 450-497)
16.5 Impairment of the Upper Extremities Due to Peripheral Nerve Disorders (p. 480-497)
16.6 Impairment of the Upper Extremities Due to Vascular Disorders (p. 498-507)
16.7 Impairment of the Upper Extremities Due to Other Disorders (p. 498-507)
16.8 Strength Evaluation (p. 507-511)
16.9 Summary of Steps for Evaluating Impairment of the Upper Extremity (p. 511-512)
16.10 Clinical Examples (p. 512-518)

Conversion Digit Values to Hand Value

<table>
<thead>
<tr>
<th>Digit</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thumb</td>
<td>40%</td>
</tr>
<tr>
<td>Index</td>
<td>20%</td>
</tr>
<tr>
<td>Middle</td>
<td>20%</td>
</tr>
<tr>
<td>Ring</td>
<td>10%</td>
</tr>
<tr>
<td>Little</td>
<td>10%</td>
</tr>
<tr>
<td>Hand</td>
<td>100%</td>
</tr>
</tbody>
</table>

Conversion Table 16-1 digit to hand (p.438).
### Conversion

- 100% UE = 60% WPI
- 100% Hand = 90% UE = 54% WPI
- 100% Thumb = 40% Hand = 36% UE = 22% WPI
- 100% Index/Middle = 20% Hand = 18% UE = 11% WPI
- 100% Ring/Little = 10% Hand = 9% UE = 5% WPI

---

### Wrong!

“If three or more values are to be combined, the two lowest values are first selected and their combined value is found. The combined value and the third value are then combined to give the total value.”

Guides page 438.
Upper Extremity Values vs. WPI

Upper Extremity Values

Hand to UE: 90% of Arm
Table 16-2: Hand to UE 9 modifier (p. 439)

UE to WPI: 60% of Body
Table 16-3: UE to WPI 6 modifier (p. 439)

2005 PDRS

Per the 2005 PDRS multiple impairments such as those involving a single part of an extremity, are combined at the upper extremity level, then converted to whole person impairment and adjusted before being combined with other parts of the same extremity (p. 1-11).
Seven Methods

- Amputations
- Digital nerve lesions
- ROM/ankylosis
- Peripheral Nerve Disorders
- Peripheral Vascular Disease
- Strength
- “Other” Disorders
Amputation
pp. 441-445

Assess Level of Amputation

- Thumb (Figure 16-4, p. 443)
- Fingers (Figure 16-5, p. 443)
Thumb amputation at MP joint = ?

= 100% thumb
= 40% hand (p.438)
= 36% UE (p. 439)
= 22% WPI (p. 439)

Amputation of little finger at PIP joint?

=% little finger ?
= 80% digit (Fig. 16-5, p.443)
= 8% hand (p. 438)
= 7% UE (p. 439)
= 4% WPI (p. 439)
Figure 16-2 (p. 441)

Impairment estimates for Upper Extremity Amputation at Various Levels

- Amputations through humerus at Proximal to deltoid tubercle level (axillary fold) = 100%UE or 60% WPI.
- Amputation at Scapulothoracic level (forequarter) = 70% WPI.
- Amputations between specified level = extrapolate

Table 16-4 (p. 440)

Impairment estimates for Upper Limb Amputation at Various Levels

<table>
<thead>
<tr>
<th>Amputation Levels</th>
<th>Digit</th>
<th>Hand</th>
<th>Limb</th>
<th>Whole Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scapulothoracic</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>70</td>
</tr>
<tr>
<td>Forequarter</td>
<td>—</td>
<td>—</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>Forequarter</td>
<td>—</td>
<td>95</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>—</td>
<td>54-90</td>
<td>56-54</td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>60</td>
<td>54</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>—</td>
<td>38</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>57-50</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>50</td>
<td>18</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>100</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>45</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Amputations</td>
<td>25</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
Comparing with Amputation Value

AMA Guides (p.434):
The most practical and useful approach to evaluating impairment of a digit is to compare the current loss of function with the loss resulting from amputation.

2005 PDRS (p. 1-11):
The composite rating for an extremity (after adjustments) may not exceed the amputation value of the extremity adjusted for earning capacity, occupation and age.

Digital Nerve Lesions
Digital Nerve Lesions

- Section 16.3 is for digital nerve loss due to lesions.
- Not to be used for peripheral nerve disorders or CRPS.
- Sensibility defects on the dorsal surfaces of the digits are not considered impairing.

Sensory Quality

AMA Guides directs (p. 446):
The sensory quality is based on the results of the two-point discrimination test carried out over the distal palmar area of the digit, or on the most distal part of the stump in the presence of a partial amputation.

<table>
<thead>
<tr>
<th>Two-Point Discrimination</th>
<th>Sensory Loss</th>
<th>Sensory Quality Impairment (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 6 mm</td>
<td>None</td>
<td>0%</td>
</tr>
<tr>
<td>7-15 mm</td>
<td>Partial</td>
<td>50%</td>
</tr>
<tr>
<td>&gt; 15 mm</td>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>
Required Information

The doctor must provide three pieces of information to properly determine impairment due to Digital Nerve Lesion –

1. sensory loss [two-point discrimination]
2. percentage of digit length affected
3. digital nerve involvement [longitudinal – ulnar or radial or transverse - both]. The information is then used with Table 16-6 (p. 448) [thumb and little finger] or Table 16-7 (p. 448) [index, middle, and ring fingers] to determine impairment.

<table>
<thead>
<tr>
<th>Table 16-6 thumb &amp; little finger</th>
<th>Table 16-7 index, middle &amp; ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Digit Length</td>
<td>Percent of Digit Length</td>
</tr>
<tr>
<td>Total</td>
<td>Partial</td>
</tr>
<tr>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>90</td>
<td>45</td>
</tr>
<tr>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
</tr>
</tbody>
</table>
Facts

- Thumb injury
- Total Transverse loss of IP joint

Impairments?

IP joint = % length?
  = 50% digit length

What is Figure 16-6 (p. 447) value?
  = 25% digit

Table 16-6 (p. 448) value?
  = 25% digit
Total Transverse sensory loss @MP joint
middle finger =?

= % digit?
= 50% digit (Fig. 16-7, p. 447)
= 10% hand (p. 438)
= 9% UE (p. 439)
= 5% WPI (p. 439)

Abnormal Motion
pp. 450-479
Definitions

- **Neutral position:** 0 degrees = “full extension” (not 180 degrees)
- **Flexion** = F
- **Extension** = E “Motion opposite to flexion”
- **Extension lag:** “Incomplete extension from a flexed position to the neutral starting point”
- **Hyperextension:** Extension exceeding the zero starting position
- **Ankylosis:** complete loss of motion of a joint = F + E
- **Plus sign** = + Joint hyperextension
- **Minus Sign** = - Extension lag

Definitions (continued)

- **Arc of motion:** degrees traced between the two extreme positions of movement in a specific plane (F to E)
- **Unit of Motion:** joint has more than one plane of movement, each is referred to as a unit of motion
- **Functional position:** the least impairing angle for fusion
Measurement Hints

“Both extremities should be compared” (p. 451)

- If uninvolved “normal” contralateral joint has less than normal ROM, subtract its ROM from impaired joint.
- If uninvolved has greater than normal ROM, may correct up to 2% of max. regional impairment rating.

Motion Pie Charts pp. 456-479

- Thumb IP joint
  Figure 16-12, p. 456
- Thumb MP joint
  Figure 16-15, p. 457
- Finger DIP joint
  Figure 16-21, p. 461
- FingerPIP joint
  Figure 16-23, p. 463
- Finger MP joint
  Figure 16-25, p. 464
- Wrist(flex/ext)
  Figure 16-28, p. 467
- Wrist(ulnar/rad dev.)
  Figure 16-31, p. 469
- Elbow(flex/ext.)
  Figure 16-34, p. 472
- Elbow(pronation/supination)
  Figure 16-37, p. 474
- Shoulder (flex/ext.)
  Figure 16-40, p. 476
- Shoulder (abd./add)
  Figure 16-43, p. 477
- Shoulder (int./ext. rotation)
  Figure 16-46, p. 479
Motion Impairment Calculation

- Motion impairment pie charts are used for motion calculation of a specific joint.
- The impairment values derived for each are added together to obtain the total motion impairment of a specific joint.
- Thumb ray has three articular units: IP, MP and CMC. Add the impairment values contributed by each motion unit (p.460).
- Fingers have three functional units: DIP, PIP and MP each calculate as specific joint. Combine the finger impairments from each joint.

Calculations Continued:

- If two or more digits are involved, calculate separately the total digit impairment for each.
- Use Table 16-1 convert each digit to hand impairment.
- Add hand impairment values from each digit to obtain total hand impairment.
- If thumb amputation is proximal to MP joint (CMC joint) the other digits are converted to UE, then added to the UE value for the thumb ray.
Peripheral Nerve Disorders
(pp. 480-497)

Evaluates

- Impairments related to disorders of the spinal nerves (C5 to C8 and T1).
- Brachial Plexus
- Major peripheral nerves of the upper extremities.
- Entrapment/compression neuropathy
- Complex regional pain syndrome (CRPS)
Underlying Causes

- Diabetes mellitus
- Chronic alcohol abuse
- Systemic neurological disorders
- Hypothyroidism and other systemic disease

Apportionment!

Evaluation Principles (p. 480)

- Sensory deficits in the digits strictly due to lesions of digital nerves are evaluated by Section 16.3
- Impairments relating to the spinal cord and central nervous system are considered in Chapters 13 and 15 of the Guides.
- Impairment due to chronic pain is discussed in Chapter 18.
- When an impairment results strictly from a peripheral nerve lesion, in the absence of CRPS, the motion values derived from Section 16.4 are not applied to this section to avoid duplication or unwarranted increase in the impairment estimation.
**Evaluation Methods**

Upper extremity impairment is calculated by multiplying the grade of severity of the sensory deficit (Table 16-10, p. 482) or motor deficit (Table 16-2, p. 482) by the maximum value of the nerve involved using the appropriate table (Table 16-13, p. 489; Table 16-14, p. 490 and Table 16-15, p. 492).

1. ID nerve involved (doctor’s job)
2. Grade sensory loss with Table 16-10 (doctor’s job)
3. Grade motor loss (doctor’s job)
4. ID max sensory value (you can do)
5. ID max motor value (you can do)
6. Multiply sensory grade by max sensory value
7. Multiply motor grade by max motor value
8. Combine sensory with motor
9. Convert: UE to WPI

---

**RED FLAGS**

Watch out for additional values based on
- Decreased pinch strength
- Decreased grip strength
- Sensory deficits due to digital nerve lesions

“\nIn compression neuropathies, additional impairment values are not given for decreased grip strength. In the absence of CRPS, additional impairment values are not given for decreased motion.”  (p. 494)
Sensory

Table 16-10, P. 482

“This table is to be used for pain that is due to nerve injury or disease that has been documented with objective physical findings or electrodiagnostic abnormalities. It is not to be used for pain in the distribution of a nerve that has not been injured except in diagnosed cases of complex regional pain syndrome.”

“The maximum value for each grade is not applied automatically.”

Motor

Table 16-11, p.484

“Weakness may be due to many causes, including pain...Table 16-11 is not to be used for rating weakness that is not due to a diagnosed injury of a specific nerve or nerves.”

“If there is doubt about the presence of a nerve injury, electromyographic studies may be necessary in order to confirm the diagnosis.”
Carpal Tunnel Syndrome post-operative (p.495):

1. Positive clinical findings of median nerve dysfunction and electrical conduction delay(s). (See Tables)
2. Normal sensibility/strength with abnormal sensory and/or motor latencies or abnormal EMG testing = rating not to exceed 5% UE (3% WPI.)
3. Normal sensibility, opposition strength, nerve conduction studies = 0% UE
Diagnosis of entrapment/compression neuropathy requires:

- The diagnosis of entrapment/compression neuropathy is based on (1) the history and symptoms; (2) objective clinical signs and findings on detailed examination; and (3) documentation by electroneuromyographic studies.
  (page 492)

Positive clinical findings and loss of function are required for a permanent impairment rating:

- Only individuals with an objectively verifiable diagnosis should qualify for a permanent impairment rating. “The diagnosis is made not only on believable symptoms but, more important, on the presence of positive clinical findings and loss of function.”
  (p. 493)

The diagnosis should be documented by electromyography as well as sensory and motor nerve conduction studies. However, it is critical to understand that there is no correlation between the severity of the conduction delay on nerve conduction velocity testing and the severity of either symptoms or, more important, impairment rating.”
  p.493
Complex Regional Pain Syndrome (CRPS) pp. 495-498

- Reflex Sympathetic Dystrophy (CRPS I)
- Causalgia (CRPS II)
- Burning pain without stimulation or movement

“The diagnosis of the syndromes should be conservative and based on objective findings” (p. 496).
At least eight of the findings must be present concurrently for a diagnosis of CRPS (p. 496).
Peripheral Vascular Disorders

PVD impairment usually involves diseases of
- Arteries
- Veins
- Lymphatic disorders

Vascular Disorders

- Reduced blood flow leads to…
- Intermittent claudication
- Pain at rest
- Ulcers
- Gangrene
- Extremity loss
- Raynaud’s phenomenon
Rating Vascular Disease

- Physical signs of vascular damage must be present and are the primary determinants in placing the examinee into one of these categories.

UE Strength Evaluation

(pp. 507-510)
- Grip & Pinch Strength
- Manual Muscle Testing

The AMA Guides directs (p. 507): Because strength measurements are functional tests influenced by subjective factors that are difficult to control and the Guides for the most part is based on anatomic impairment, the Guides does not assign a large role to such measurements.
**Principles**

- Strength impairment is only provided in the “rare case” (p. 508).

- Strength loss can be combined with other impairments “only if based on unrelated etiologic or pathomechanical causes.” (p. 508);

- Decreased strength cannot be rated in the presence of decreased motion, painful conditions, deformities, or absence of parts (eg. thumb amputation) that prevent effective application of maximal force in the region being evaluated.

- “Motor weakness associated with disorders of the peripheral nerve system and various degenerative neuromuscular conditions are evaluated according to guidelines described in Section 16.5…” (p. 508)

- “Strength can only be applied as a measure when a year or more has passed since the time of injury or surgery.” (p. 508)

- “Manual muscle testing of major groups is used for testing strength about the elbow and shoulder.” (p. 508)
Principles

- If there is more than 20% variation in the readings, one may assume the individual is not exerting full effort.” (p. 508)

- Results of strength testing should be reproducible on different occasions or by two or more trained observers.” (p. 509)

The Guides provides instructions for the use of Table 16-35 (p. 510):

- The severity of strength deficits is classified and rated on the same principles used for evaluation of the peripheral nerves (Table 16-11).

- In the absence of peripheral nerve involvement, most weaknesses usually fall in the grade 4 category… Few injuries result in a more profound weakness, such as a grade 3 category…

- Table 16-35 requires complete range of motion (see footnote).
Tendinitis

This impairment is not normally provided (p. 507):

“Several syndromes involving the upper extremities are variously attributed to tendinitis, fasciitis, or epicondylitis. The most common of these are the stubborn conditions of the origins of the flexor and extensor muscle of the forearm where they attach to the medial and lateral epicondyles of the humerus. Although these conditions may be persistent for some time, they are not given a permanent impairment rating unless there is some other factor that must be considered.”

Under specific circumstances, grip loss can be considered:

- If an individual has had tendon rupture or has undergone surgical release of the flexor or extensor origins or medial or lateral epicondylitis, or has had excision of the epicondyle, there may be some permanent weakness of grip as a result of the tendon rupture or the surgery. In this case, impairment can be given on the basis of weakness of grip strength according to Section 16.8b. (page 507)
Other Disorders (p. 498-507)

The purpose of the ‘Other Disorders’ section of the AMA Guides is frequently overlooked. This section is only to be used when other criteria have not adequately encompassed the impairment. In other words, this is an additional impairment (page 499, italics in original):

- Impairments from the disorders considered in this section under the category of "other disorders" are usually estimated by using other impairment evaluation criteria. The criteria described in this section should be used only when the other criteria have not adequately encompassed the extent of the impairments.

As such, the application of this impairment is a medical decision and requires additional supporting documentation.

Requires Additional Calculation

- The severity of impairment due to these disorders is rated separately according to Tables 16-19 through 16-30 and then multiplied by the relative maximum value of the unit involved as specified in Table 16-18. (page 498)
Section 16.7a Bone and Joint Deformities

Joint Swelling Due to Synovial Hypertrophy.
Synovial hypertrophy cannot be combined with other methods:
- If synovial hypertrophy is the only finding, the joint impairment is rated according to Table 16-19 and multiplied by the relative maximum value of the joint involved (Table 16-18). It cannot be combined with impairment due to decreased joint motion or other findings. (page 500)

Shoulder Instability

Shoulder instability must be thoroughly documented:
- Shoulder instability, recurrent subluxation, or dislocation must be adequately documented through a complete medical history, physical examination, and radiographic findings. Magnetic resonance imaging (MRI), arthroscopy, and examination under anesthesia may be useful components of the evaluation. An individual’s complaint of feeling or fearing that a joint is “popping” or “going out of place” without adequate clinical findings is not a basis for permanent impairment rating. (page 504)
Impairment noted in Table 16-26 has already been multiplied by the value of the shoulder:
- The shoulder representing 60% of the upper extremity (Table 16-18), the patterns of occult (10%), subluxating (20%), and dislocating (40%) instabilities represent upper extremity impairments of 6%, 12%, and 24%, respectively. (page 504)

Shoulder instability impairment can only be combined with decreased motion impairment:
- This value may be combined only with impairments due to decreased motion (Section 16.4). Pain and decreased muscle strength are not rated separately. (page 504)