Upper Extremity Impairment Rating Methodology and Case Presentation

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To Rate or Not to Rate

That is the Question!
Objectives

- Definition of terms
- The process of impairment evaluation using the AMA Guidelines
- Components of an impairment report
- Demonstrate ability to perform musculoskeletal impairment evaluations
Impairment ≠ Disability

- Disability
- Pain
- Impairment
JAMA Feb 15, 1958

12 other guides were published in the JAMA over the next twelve years. Of interest to us are the guide on the vascular system, published March 5, 1960, and the guide on the peripheral nervous system which was published July 13, 1964. Musculoskeletal System
Evolution of the *Guides*


1st 2nd 3rd 3rd R 4th 5th 6th
History of the AMA Guides

- **1956** - ad hoc committee
- **1958-1970** - 13 publications in JAMA
- **1971** - First Edition
- **1981** - established 12 expert panels
- **1984** - Second Edition
- **1988** - Third Edition
- **1990** - Third Edition - Revised
- **1993** - Fourth Edition (4 printings)
- **2007 (December)** – Sixth Edition
  - Radical paradigm shift
AMA Guides Growth in Size

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AMA Guides to the Evaluation of Permanent Impairment
- Fourth Edition
Goals

- Explain the concept of impairment
- Discuss the proper use of the *AMA Guides*
- Explain source and limitations of the *Guides*
- Describe the steps involved in evaluating impairment
- Discuss critical issues encountered in the use of the *Guides*
Purpose of the *Guides*

- Provide a reference framework

- Achieve objective fair and reproducible evaluations

- Minimize adversarial situations

- Process for collecting, recording, and communicating information
The AMA *Guides* must adopt the terminology and conceptual framework of disablement as put forward by the International Classification of Functioning, Disability and Health (ICF). *(WHO, 2001)*
History of the Guides

- 1956 - ad hoc committee
- 1971 - First Edition
- 1981 - established 12 expert panels
- 1984 - Second Edition
- 1988 - Third Edition
- 1990 - Third Edition-Revised
- 1993 - Fourth Edition (3 printings)
- 2000 – Fifth Edition
Impairment

- Condition that interferes with an individual’s activities of daily living.

- An alteration of an individual's health status that is assessed by medical means.

- The loss of, loss of use of, or derangement of any body part, system or function.
Impairment Rating Does NOT

- Determine Medical Care
- Comment on causation
- “Impairment evaluations are usually performed not to establish academic facts or to make treatment decisions but, rather, to establish the financial obligations of payers to individuals, or, conversely, the entitlement of individuals to monetary rewards.”
Impairment **DOES NOT** equal Disability

- **Example**: both a lawyer and a pianist sustain an *amputation* of the non-dominant *little finger*.
  - Both have the *same impairment*
    - 100% of the digit, 10% of the hand, 9% of the upper extremity, 5% whole person
  - The *lawyer* has *no disability*
  - The *pianist* is unable to perform his occupation
    - Totally disabled for his occupation
    - Fully capable of many jobs
- **Physician’s role**: Determine IMPAIRMENT
Permanent

- *Guides* apply only to “permanent” impairments

- Must be at “maximal medical improvement”
Permanent Impairment

- Impairment that has become finalized and is unlikely to change in spite of further medical or surgical therapy.

- Unlikely to change substantially by more than 3 percent within the next year with or without medical treatment.
  - *(AMA Guides, 4th Ed., p 1.1)*
Maximum Medical Improvement

- Stable and plateaued
- Permanent and stationary
- Date after which further recovery and restoration of function is unlikely to occur
Maximum Medical Improvement

- **Definition**: Maximal Medical Improvement
  - “Maximum Medical Improvement (MMI) refers to a status where the person is as good as he/she is going to get from the medical and surgical treatment available to him/her. It can also be conceptualized as a date from which further recovery or deterioration is not anticipated, although over time (beyond twelve months) there may be some expected change.”
What is the determinate factor?

Activities of Daily Living

ADLs
What are Activities of Daily Living?

- Bathing, showering
- Dressing
- Eating
- Feeding
- Functional mobility
- Personal device care
- Personal hygiene and grooming
- Sexual activity
- Sleep/rest
- Toilet hygiene
What is an impairment percentage intended for?

“an informed estimate of the degree to which an individual’s capacity to carry out daily activities has been diminished.”
Impairment Rating is Simply an ESTIMATE

- Does not provide additional clinical information
- Does not necessarily provide direct information concerning disability
Impairment

vs.

Disability
Disability

- An alteration of an individual’s capacity to meet personal, social or occupational demands or statutory or regulatory requirements because of an impairment.

- Any activity or task an individual cannot accomplish.
Disability

- Involves many intangibles

- Functional demands and motivation are both links between impairment and disability
We are all to some degree DISABLED?

MY NEW CHAIR CAN BE ADJUSTED TO A JILLION DIFFERENT POSITIONS.

THAT PRACTICALLY GUARANTEES I'M USING IT IN A SUBOPTIMAL WAY. I THINK IT MIGHT BE DISABLING ME.
Disability equals losses (perceived or real)

- Physical ability
- Activities of daily living
- Comfort
- Sense of well-being
- Cognitive
Impairment vs. Disability

- Even when the impairment is well localized, its consequences (disability) cannot be understood without taking the person into account.
Handicap

- Impairment that substantially limits one or more of life’s activities

- **Obstacles** to accomplishing life’s basic activities that can be overcome only by compensating in some way for the effects of the impairment

- Definitions rarely used
Who evaluates?

- Physician’s responsibility to evaluate a patient’s health status and determine the presence or absence of an impairment.

- Occupational medicine physicians may provide insights on workers’ disabilities and handicaps.
Guides consist of:

- Chapter 1 - Impairment Evaluation
- Chapter 2 - Records and Reports
- Chapter 3 - Musculoskeletal System
- Chapters 4 - 14 Other Systems
- Chapter 15 - Pain
- Glossary
- Combined Value Table
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Process

- Records and Reports, specifies required information

- Describe process of analysis and provide criteria

- Need to base rating on reliable data
Limitations of the *Guides*

- All impairments are not covered

- Human function is dynamic and variable

- No demonstration of validity or reliability of measurements
“The physician’s judgment and his or her experience, training, skill, and thoroughness in examining the patient and applying the findings to *Guides* criteria will be factors in estimating the degree of the patient’s impairment.”
Is the *Guides* Widely Used?

Mandated or recommended in most US and Canadian workers compensation jurisdictions
Used Worldwide

- United States
- Canada
- Australia
- New Zealand
- France
- Netherlands
- Italy
Fundamentals of Workers’ Compensation

- Purpose
- Payments
  - Compensation for Lost Wages
  - Medical bills
  - Award for permanent disability (impairment)
What do the Guides officially state concerning impairment estimates and compensation?

• "It must be emphasized and clearly understood that impairment percentages derived according to the Guides’ criteria should not be used to make direct financial awards or direct estimates of disabilities."

• *4th Ed., 1.5*
Usefulness of the *Guides* for Claims Litigation
Rationale

- Increases objectivity and enables physicians to evaluate and report medical impairments in a standardized manner
- Minimize abuses and unrealistic verdicts that may arise from unjustified claims
Employability

- If an individual with a medical abnormality has the capacity, with or without accommodation, to meet job demands and the conditions of employment as defined by the employer; the individual is employable and is not necessarily disabled.
Factors

• Capacity to travel to and from work

• Be at work

• Perform assigned tasks and duties for which the employer is willing to pay wages
Major Objective of the Guides

- Define the assessment and reporting of medical impairments so that physician can collect, describe, and analyze information about impairments in accordance with a single set of standards
Verification of Accuracy

- If the clinical findings are fully described, any knowledgeable observer may check the findings with the *Guides* criteria.
- The persons who receive the evaluations may be held accountable for assessing the results in accordance with the *Guides* recommendations.
- By consulting the standardized medical evaluation protocols and reference tables and reviewing the recommendations of the *Guides*, the recipient may verify whether or not all necessary information was collected.
Reports serve as a means of communications

- Information will be utilized by non-medical persons to determine:
  - disability
  - compensation
  - accident-relatedness
  - employability
Impairment Rating is a simple number

“Does not covey information about the person or the impact of the impairment on the person’s capacity to meet personal, social, or occupational demands.”
Past Records Important

“Knowledge of the course of any individual’s medical condition over time is essential in reaching an understanding of the individual’s health status.”
Impairment evaluation involves three steps

- Medical evaluation
- Analysis of findings
- Comparison of results to criteria in the *Guides*

- 4th Ed., 2.4
Rating vs. Evaluation

“Comparison is distinct from the preceding clinical evaluation and need not be performed by the physician who did that evaluation; rather, any knowledgeable person can compare the clinical findings with the Guides criteria and determine whether or not the impairment estimates reflect those criteria.”
Rules – are critical!

- Estimate the extent of the patient’s primary impairment or impairing condition

- Estimate based on current findings and evidences

- Express as whole-person impairment (unless jurisdictional use states otherwise)
“Whole Person”

- all physical and mental impairments affect the *whole person*

- all impairment ratings are “combined”
What is the concept of combining?

“A method of combining impairments is based on the idea that a second or a succeeding impairment should apply not to the whole, but only to the part that remains after the first and other impairments have been applied.”

• 4th Ed., p. 24, 3.1e
### Combined Values Chart

The values are derived from the formula A + B (1 - A) combined with the equivalents of the impairment ratings. In the chart, all values are impairment values, locate the larger of the values on the side of the table, and then read down to the column indicated by the smaller value at the bottom of the chart. The number in the column is the combined value.

For example, to combine 35% and 29%, read down the side of 35% to 16 (35% of 100) and then read across the 29% row until you come to the column in the intersection of the row and column is the number 48. Therefore, construction of this chart, the larger impairment value must be sought first.

If three or more impairment values are to be combined, select the two largest values. Then use that value and the third to locate the combined value. If four or more are used, the result is an indefinitely, the final value in each instance being the combined of 100% process the larger impairment value must be identified at the start.

Note: If impairments from two or more organs systems are to be combined, each must first be expressed as a whole-person impairment percentage.
What is the combined value of 20% and 30%?

A - 50%
B - 25%
C - 44%
D - 10%
Impairment must be based on objective findings

“If, in spite of an observation or test result, the medical evidence appears not to be of sufficient weight to verify that a permanent impairment of a certain magnitude exists, the physician should modify the impairment according, describing the modification and explaining the reason for it in writing.”

- 4th Ed., 2.2
3.1 Upper Extremity

“If the examiner determines that the estimate for the anatomic impairment does not sufficiently reflect the severity of the patient’s condition, the examiner may increase the impairment percent, explaining the reason for the increase in writing.”

• 4th Ed., p. 64
Interpolating, Measuring and Rounding Off

- Interpolate

- Readings should lie within 10% of each other

- Separate evaluators should lie within 10% of one another

- Range of motion measurements are rounded to the nearest 10 degrees
(ROM) Range of Motion?

- “The results of such evaluations should be consistent and concordant with the presence or absence of pathologic signs and other medical evidence.”
  - 4th Ed., p. 14

- Active ROM used (vs. passive)
Pain

“In general the impairment percents shown in the chapter that consider the various organ systems make allowance for the pain that may accompany the impairing condition.”

• 4th Ed., 2.2
What about prostheses?

- Remove prostheses or assistive devices, if feasible, prior to rating.
What about effects of treatment?

- Treatment may hide impairment.

- Treatment may lead to impairment.
Permanent and Current

“Impairment should not be considered ‘permanent’ until the clinical findings, determined during a period of months, indicate that the medical condition is static and well stabilized.

The physician should assess the current state of the impairment.
Apportionment

“Estimate of the degree to which each of various occupational or nonoccupational factors may have caused or contributed to a particular impairment.” (Glossary, 315)
Apportionment Analysis

• Consider the nature of the impairment and its possible relationship to each alleged factor

• Provide an explanation of the medical basis for all conclusions and opinions
Apportioning Impairment

- Determine current impairment
- Determine prior impairment (on basis of information previously gathered)
Apportioning Impairment

“The estimate for the preexisting impairment would be subtracted from that for the previous impairment to account for the effects of the former.”
Example of Apportionment

- Examinee had previous problems with low back pain with documented guarding attributable to Injury A, e.g. DRE II – 5% wpi
- With Injury B herniates and has a radiculopathy, e.g. DRE III – 10% wpi
- Incremental impairment with Injury B is 5%, e.g. increased from 5% to 10% wpi
Essential Guidelines – Preparing Reports

• “Clear, accurate and complete report is essential to support a rating of permanent impairment.”

• “Record of Medical Evaluation” (11-12) useful resource
1. Medical Evaluation

- Narrative history
- Results of most recent clinical evaluation
- Assessment of current clinical status and plans
- Diagnosis and clinical impressions
- Estimated date of recovery
2. Analysis of Findings

- Impact
- Medical status
- Prognosis
- Restrictions
3. Comparison to Criteria

- Specific clinical findings
- Explanation of each impairment with reference to criteria
- Summary list of all impairments
Process

• This three step process applies to rating all organ systems

• Underlying impairment evaluation concepts may differ
Glossary - useful information!

- Terms Used in Assessments
- Aggravation, Recurrence, Causation, Disability, Workers’ Compensation and Employability
- Social Security Disability Determinations
- Americans with Disabilities Act
Can you define these terms?

- Impairment
- Apportionment
- Clinical Evaluation
- Disfigurement
- Intensity and Frequency
- Medically Documented
- Daily Living Activities
Intensity

- **Minimal** - annoying but no diminution in capacity
- **Slight** - some diminution in capacity
- **Moderate** - serious diminution in capacity
- **Marked** - preclude carrying out activities of daily living
Frequency

- **Intermittent** - $< \frac{1}{4}$ of time
- **Occasional** - $\frac{1}{4} - \frac{1}{2}$ of time
- **Frequent** - $\frac{1}{2} - \frac{3}{4}$ of time
- **Constant** - all of time
What are the meaning of these terms?

- Aggravation
- Recurrence
- New Injury
- Disability
- Illness, Disease

- Employability
- Employability Determination
- Medical Determination Related to Employability
- Risk, Hazard
- Possibility, Probability
Goals

- Demonstrate the ability to rate upper extremity impairments
- Explain calculating peripheral nerve impairment
- Discuss the process of evaluating “Impairment Due to Other Disorders”
- Using clinical case scenarios, demonstrate the ability to calculate combined impairments of upper extremity problems
Musculoskeletal Sections

• 3.1 – Upper Extremity
• 3.2 – Lower Extremity
• 3.3 – Spine
• 3.4 – Pelvis
Instrumentation

- Goniometers
- Inclinometers
- Neurological
- Electrophysiologic Studies
Goniometers
Inclinometers
Neurological
Motion Measurements

- Active

- Determined with the patient’s full effort and cooperation

- Reproducible

- Compare to passive motion
  - (note: use caution)
The Hand and Upper Extremity
The Hand and Upper Extremity

- 3.1a Evaluation
- 3.1b Evaluating Amputation
- 3.1c Evaluating Sensory Loss of Digits
- 3.1d Evaluating Abnormal Motion
- 3.1e Combining Impairment Values
- 3.1f Thumb
- 3.1g Fingers
- 3.1h Wrist
- 3.1i Elbow
- 3.1j Shoulder
- 3.1k... Peripheral Nerve Disorders
- 3.1l... Vascular Disorders
- 3.1m... Other Disorders
- 3.1n Combining Regional Impairments
- 3.1o Summary
Evaluation Methods

- Physical – primary method
- Cosmetic
- Functional
Methodology

- Based on the International Federation of Societies for Surgery of the Hand

- In association with the American Society for Surgery of the Hand
Figure 1

- Upper Extremity Impairment Evaluation Record (16-17) should be completed
  - Part 1 – Hand
  - Part 2 – Other Aspects
### Figure 1. Upper Extremity Impairment Evaluation Record—Part 1 (Hand)

<table>
<thead>
<tr>
<th>Abnormal motion</th>
<th>Amputation</th>
<th>Sensory loss</th>
<th>Other disorders</th>
<th>Hand impairment%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record motion, arthrosis, and impairment %</td>
<td>Mark level &amp; impairment %</td>
<td>Mark type, level &amp; impairment %</td>
<td>List type &amp; impairment %</td>
<td>+ Combine digits IMP %</td>
</tr>
<tr>
<td>M. IP</td>
<td>Angle°</td>
<td>IMP%</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>IMP%</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Radial abduction</td>
<td>CMC</td>
<td>Angle°</td>
<td>IMP%</td>
<td>1</td>
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<tr>
<td></td>
<td>IMP%</td>
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</tbody>
</table>

Add impairment % CMC + MP + IP = [ IMP % ]

<table>
<thead>
<tr>
<th>Abnormal motion</th>
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<th>Other disorders</th>
<th>Hand impairment%</th>
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<td>Opposition</td>
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<tr>
<td></td>
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<td>3</td>
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Add impairment % CMC + MP + IP = [ IMP % ]

---

**Figure 2. Upper Extremity Impairment Evaluation Record—Part 2 (Wrist, elbow, and shoulder)**

<table>
<thead>
<tr>
<th>Abnormal motion</th>
<th>Amputation</th>
<th>Sensory loss</th>
<th>Other disorders</th>
<th>Regional impairment %</th>
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<td>2</td>
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<tr>
<td></td>
<td>IMP%</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Elbow</td>
<td>Angle°</td>
<td>IMP%</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>IMP%</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Shoulder</td>
<td>Angle°</td>
<td>IMP%</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>IMP%</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Add IMP% F/E + RD/UD = [ IMP % ]

Add IMP% F/E + PRO/SUP = [ IMP % ]

Add IMP% F/E + Add Abd + IR/ER = [ IMP % ]

1. Amputation impairment (other than digits)
2. Regional impairment of upper extremity
   - Combine hand IMP % + wrist IMP % + elbow IMP % + shoulder IMP %
3. Peripheral nerve system impairment
4. Peripheral vascular system impairment
5. Other disorders (not included in regional impairment)

Total upper extremity impairment = Combine (1 + 2 + 3 + 4 + 5) I

Impairment of the whole person (Use Table 3 p. 20)

---

*Combined Values Chart: (p. 32-324)
*Use Table 1 (Digits to hand p. 18)
*Use Table 2 (Hand to upper extremity p. 19)
*Use Table 3 (p. 20)

** Courtesy of G. de Groot Svensson, MD**
Previous Injury

- Based on the actual findings
- Prior injury receive consideration only if valid evidence
Cumulative Trauma Disorders

“A patient with wrist or hand pain or other symptoms may not have evidence of a permanent impairment. Alteration of the patient’s daily activities or work-related task may reduce the symptoms. Such an individual should not be considered to be permanently impaired under Guides criteria.”
Relationship of Upper Extremity to Whole Person

- Upper Extremity = 60% of the whole person
- Table 3. Relationship of Impairment of the Upper Extremity to Impairment of the Whole Person (20)
3.1 b Evaluating Amputation

- Fig. 2 (18), Impairment of Upper Extremity from Amputation
- Fig. 3 (18), Impairment of the Digits
- Fig. 7 (23), Impairment of the Thumb Due to Amputation at Various Levels
- Fig. 17 (30), Finger Impairment Due to Amputation at Various Levels
Figure 2 (18)

Impairment of Upper Extremity from Amputation at Various Levels

100% of extremity, or 60% of the whole person

95%

90%
Figure 3 (18)
Impairments of the Digits and the Hand for Amputations at Various Levels
Figure 7 (24)
Impairment of the Thumb Due to Amputation at Various Levels

![Diagram showing thumb impairment due to amputation at various levels. The x-axis represents total transverse sensory loss impairment (%), and the y-axis represents thumb impairment due to amputation impairment (%). Various amputation levels (TIP, IP, MP) are marked on the diagram, each associated with a specific impairment percentage.]
Figure 17. Finger Impairment Due to Amputation at Various Lengths (top scale) and Total Transverse Sensory Loss (bottom scale). Total transverse sensory loss impairments correspond to 50% of amputation impairments.*
Once you calculate impairment of the digit

- Convert Digit to Hand - Table 1 (Page 18)
- Convert Hand to Upper Extremity - Table 2 (Page 19)
  - [Hand = 90% UE]
- Convert Upper Extremity to Whole Person Table 3 (Page 20)
  - [UE = 60%) WP]
Table 1. Relationship of Impairment of the Digits to Impairment of the Hand

<table>
<thead>
<tr>
<th>% Impairment of Thumb</th>
<th>% Impairment of Index or Middle Finger</th>
<th>% Impairment of Ring or Little Finger</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 = 0</td>
<td>0-2 = 0</td>
<td>0-4 = 0</td>
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<tr>
<td>2-3 = 1</td>
<td>3-7 = 1</td>
<td>5-14 = 1</td>
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<td>4-6 = 2</td>
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<td>15-24 = 2</td>
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<td>7-8 = 3</td>
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<td>9-11 = 4</td>
<td>18-22 = 4</td>
<td>35-44 = 4</td>
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<tr>
<td>12-13 = 5</td>
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<td>14-16 = 6</td>
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<td>65-74 = 7</td>
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<td>19-21 = 8</td>
<td>38-42 = 8</td>
<td>75-84 = 8</td>
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<tr>
<td>22-23 = 9</td>
<td>43-47 = 9</td>
<td>85-94 = 9</td>
</tr>
<tr>
<td>24-26 = 10</td>
<td>48-52 = 10</td>
<td>95-100 = 10</td>
</tr>
</tbody>
</table>

Thumb = 40% Hand
Index or Middle Finger = 20% Hand
Ring or Little Finger = 10% Hand
Table 2 (Page 19). Relationship of Impairment of Hand to Impairment of the Upper Extremity

- Hand = 90% Upper Extremity
Table 3 (page 20)
Relationship of Impairment of the Upper Extremity to Impairment of the Whole Person

- **Upper Extremity** = 60% Whole Person
Case Exercise

A 20 year old amputates his index finger at the PIP joint.

What is the impairment, expressed as whole person?

A - 2% Whole Person
B - 4% Whole Person
C - 8% Whole Person
D - 16% Whole Person
Evaluating Sensory Loss of the Digits – *Not other Peripheral Nerves*

- **Digit Involvement**
  - Transverse (both digital nerves)
  - vs. Longitudinal (Radial or Ulnar)
  - Level (% of length of the digit)

Note: Total transverse sensory = 100% sensory loss and receives 50% of the amputation impairment

- **Sensory Quality**
Impairment of Hand Due to Total Transverse Sensory Loss of Digits and Longitudinal Sensory Loss

Figure 5 (Page 22)
Two-point Discrimination Test

- Weber static two point discrimination
- Paper clip
  - Figure 4 (Page 21)
- Anesthesiometer
- Disk-Criminator
- 2-Point Discrimination Device
Two Point Discrimination

- Greater than 15 mm = total sensory loss of 100%
- Between 15-7 mm = partial sensory loss or 50% sensory impairment
- Equal to or less than 6 mm = normal sensibility or 0%
Transverse Sensory Loss of Digits

- Figure 7 (page 24) Thumb
- Figure 17 (page 30) Finger
- Total Sensory Loss = 50% Amputation Value
Longitudinal Sensory Loss

- Level of involvement is calculated as a percentage of the length of the digit (Reference Figure 7 (Page 24) - Thumb, Figure 17 (Page 30) - Finger)

- Table 8 (Page 31) - Longitudinal Sensory Loss Impairment for the Thumb and Little Finger

- Table 9 (Page 31) - Longitudinal Sensory Loss Impairment of Index, Middle and Ring Fingers
Table 8 (Page 31) - Longitudinal Sensory Loss Impairment for the Thumb and Little Finger

<table>
<thead>
<tr>
<th>Percent of digit length</th>
<th>Longitudinal sensory loss %</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ulnar digital nerve</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total loss</td>
<td>Partial loss</td>
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<tr>
<td>100</td>
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<tr>
<td>40</td>
<td>12</td>
<td>6</td>
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<td>30</td>
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<td>3</td>
<td>2</td>
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<tr>
<td></td>
<td>Radial digital nerve</td>
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<tr>
<td></td>
<td>Total loss</td>
<td>Partial loss</td>
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<td>8</td>
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<td>2</td>
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<td>2</td>
<td>1</td>
<td></td>
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</tr>
</tbody>
</table>
Table 9 (Page 31) - Longitudinal Sensory Loss Impairment of Index, Middle and Ring Fingers

<table>
<thead>
<tr>
<th>Percent of digit length</th>
<th>Longitudinal sensory loss (%)</th>
<th>Ulnar digital nerve</th>
<th>Radial digital nerve</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total loss</td>
<td>Partial loss</td>
<td>Total loss</td>
</tr>
<tr>
<td>100</td>
<td>20</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>90</td>
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<td>27</td>
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<tr>
<td>80</td>
<td>16</td>
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<tr>
<td>70</td>
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<tr>
<td>40</td>
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<td>30</td>
<td>6</td>
<td>3</td>
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<tr>
<td>20</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
Case Exercise

- Laceration to radial digital nerve at PIP joint of index finger
- 2 pt. discrimination = 10 mm
- What is the impairment, expressed as whole person?
  
  A - 1%
  B - 2%
  C - 3%
  D - 4%
Other hand nerve impairment

- Loss of palmar cutaneous nerve sensibility = 5% hand
- 0 to 10% upper extremity
  - Loss of sensibility of the palmar or dorsal ulnar cutaneous nerve
  - Palmar branch of the median nerve
  - Superficial branch of the radial nerve
Other peripheral nerve lesions

- Section 3.1k . . . Considers evaluation of sensory losses proximal to digit level and motor losses of the upper extremity
Combining

- When there is more than one impairment of a member, such as abnormal motion, sensory loss, and amputation of a finger, the impairments must be *combined* before the conversion to the next larger unit.
3.1d Evaluating Abnormal Motion (Page 22)

- **Neutral Position = 0 degrees**
- **Flexion (F)**
- **Extension (A)**
  - + Hyperextension
  - - Extension Lag
- **Ankylosis (A) = E + F**
Figure 6 (Page 23)

Illustration of MP Joint Positions

Flexion

Extension

Position 1: 45° Flexion
Position 2: 0° Full Extension
Position 3: +15° Hyperextension
-15° Extension Lag
3.1f Thumb (Page 24)

- Amputation of Thumb
- Sensory Loss of Thumb
- Abnormal Motion of Thumb (motion components of joints added)
- Combine above
Components of Abnormal Motion of Thumb

- Interphalangeal (IP) Joint: Flexion and Extension (15%)
- Metacarpophalangeal (MP) Joint: Flexion - Extension (10%)
- Adduction (20%)
- Radial Abduction (10%)
- Opposition (45%)
- Add all range of motion deficits of the thumb
Interphalangeal (IP) Joint: Flexion and Extension

Figure 8 (Page 25) Positions

Figure 9 (Page 26) Impairment Curves
Thumb Impairments Due to Abnormal Motion at the Thumb
Case Exercise

- What is the impairment of the thumb if there is limitation of motion at the IP joint?
  - Flexion limited to 50 degrees
  - Extension lag of 20 degrees
- What is the impairment of the whole person?
  A - 1%
  B - 2%
  C - 3%
  D - 4%
Metacarpophalangeal (MP) Joint: Flexion - Extension

Figure 11 (Page 27) Positions

Figure 12 (Page 27) Impairment Curves
Metacarpophalangeal (MP) Joint: Flexion - Extension

Figure 13 (Page 26)

Impairment Values
Adduction

Measure and record the smallest possible distance in centimeters from the flexor crease of the thumb IP joint to the distal palmar crease over the MP joint of the little finger (Normal = 0 cm.)

Note: % impairment relates to adduction loss which is 20% thumb
Adduction

Table 5 (Page 28)

Impairment Values

<table>
<thead>
<tr>
<th>Measured lack of adduction (cm)</th>
<th>% Thumb due to Abnormal motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>13</td>
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<tr>
<td>6</td>
<td>8</td>
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<td>5</td>
<td>6</td>
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<tr>
<td>4</td>
<td>4</td>
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<tr>
<td>3</td>
<td>3</td>
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<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Radial Abduction

Measure and record the largest possible angle in degrees formed by the first and second metacarpals.
Radial Abduction

Table 6 (Page 28)

<table>
<thead>
<tr>
<th>Measured radial abduction (°)</th>
<th>% Thumb due to Abnormal motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>20</td>
<td>7</td>
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<tr>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>
Measure and record the largest possible distance in centimeters from the flexor crease of the thumb IP joint to the distal palmar crease directly over the third MP joint.

Figure 16 (29)
Linear Measurements

Note: Impairment refers to opposition loss which is equal to 45% thumb
Opposition

Thumb Impairments Due to Lack of Opposition and to Ankylosis

Table 7 (Page 29)

<table>
<thead>
<tr>
<th>Measured opposition (cm)</th>
<th>% Thumb impairment due to Abnormal motion</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>45</td>
</tr>
<tr>
<td>1</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>22</td>
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<td>3</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>9</td>
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<td>5</td>
<td>5</td>
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<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>0</td>
</tr>
</tbody>
</table>
Add all range of motion deficits of the thumb, combine with other deficits
Case Exercise

- Examinee has a sensory impairment which equates to 10% of the thumb
- ROM deficits: IP joint ankylosed at 40 degrees and measured opposition is only 5 cm, otherwise ROM is normal
- What is the whole person impairment?
  - A - 2%
  - B - 3%
  - C - 4%
  - D - 5%
3.1g Fingers (Page 30)

- Amputation
- Sensory Loss
- Abnormal Motion
  - DIP – Distal Interphalangeal
  - PIP – Proximal Interphalangeal
  - MP - Metacarpophalangeal
Range of Motion

- **Measure:**
  - Distal Interphalangeal (DIP) Joint: Flexion - Extension
  - Proximal Interphalangeal (PIP) Joint: Flexion - Extension
  - Metacarpophalangeal (MP): Flexion - Extension

- **Add** range of motion deficits of each joint
- **Combine** range of motion deficits from all involved joints on the digit
Figure 18 (Page 32)

Distal Interphalangeal (DIP) Joint: Flexion - Extension
Figure 19 (Page 32)

Distal Interphalangeal (DIP) Joint: Flexion - Extension

$10\% + 4\% = 14\%$
Figure 20 (Page 33)

Proximal Interphalangeal (PIP) Joint: Flexion - Extension
Figure 21 (Page 33)

Proximal Interphalangeal (PIP) Joint: Flexion - Extension
Figure 22 (Page 34)

Metacarpophalangeal (MP): Flexion - Extension
Figure 23 (Page 34)

Metacarpophalangeal (MP): Flexion - Extension
For each digit individually, combine impairment due to:

- Abnormal motion
- Amputation
- Sensory loss
- Other disorders
Multiple Digit Involvement

- Translate each digit’s impairment to the hand impairment - Table 1, p. 18

- Add all of the hand impairment from each digit

- Use Figure 1.
Amputation = 92% impairment of the upper extremity
Range of Motion

- Flexion and extension (36)
  - Figure 24 - Illustrations
  - Figure 25 - Curves
  - Figure 26 - Impairments
- Radial and ulnar deviation (37)
  - Figure 27 - Illustrations
  - Figure 28 - Curves
  - Figure 29 - Impairments
- Add range of motion deficits
Wrist Flexion and Extension

Figure 24 (Page 36)
Figure 26 (Page 36)

Wrist Flexion and Extension Impairments
Figure 27 (Page 37)

Radial Deviation and Ulnar Deviation
Impairments of Radial and Ulnar Deviation
Case Example

- Flexion = 50°, Extension = +30°
- Radial dev. = 20°, Ulnar dev. = 10°
- What is the whole person impairment?
  - A - 3% WP
  - B - 5% WP
  - C - 7% WP
  - D - 11% WP
3.1 i Elbow (Page 38)

Amputation = 96% impairment of the upper extremity
Range of motion

- Flexion and extension (39-40)
  - Figure 30 - Illustrations
  - Figure 31 - Curves
  - Figure 32 - Impairments
- Pronation and Supination (40)
  - Figure 33 - Illustrations
  - Figure 34 - Curves
  - Figure 35 - Impairments
- **Add** range of motion deficits
Figure 30 (Page 39)

Flexion and Extension of Elbow
Impairments of Flexion and Extension
Figure 33 (Page 40)

Pronation and Supination of Forearm
Impairments of Pronation and Supination
3.1 j Shoulder

Amputation = 100% upper extremity
Abnormal Motion

- Flexion and extension
  - Figure 36 - Illustration
  - Figure 37 - Curves
  - Figure 38 - Impairments
- Abduction and adduction
  - Figure 39 - Illustration
  - Figure 40 - Curves
  - Figure 41 - Impairments
• Internal - external rotation
  • Figure 42 - External Rotation and Internal Rotation
  • Figure 43 - Curves
  • Figure 44 - Impairments
• Add range of motion deficits
Shoulder Extension and Flexion
Shoulder Extension and Flexion Impairments
Shoulder Abduction and Adduction

Figure 39 (Page 43)
Figure 41 (Page 44)

Shoulder Abduction and Adduction Impairments
Shoulder
External and
Internal
Rotation
Figure 44 (Page 43)

Shoulder External and Internal Rotation
Combining upper extremity ratings

All upper extremity ratings are combined in order from distal to proximal to determine total upper extremity rating.
3.1 k Impairment of the Upper Extremity Due to Peripheral Nerve Disorders

• Method of Evaluation
• Sensory Deficits and Pain
• Motor Deficits and Loss of Power
• Combining Multiple Deficits
Determination of Impairment

- Spinal Nerves
- Brachial Plexus
- Major Peripheral Nerves
- Entrapment Neuropathy
- Causalgia and Reflex Sympathetic Dystrophy
Peripheral Spinal Nerves

- Can be rated according to the three groups of fibers:
  Sensory, Motor Autonomic

If autonomic nerve fibers affect a specific organ or body system, that Chapter should be consulted to determine the degree of impairment.
The First Step in Rating a Nerve

- Identify the nerve involved
- Determine its value for total motor and sensation
Table 10
Origins and Functions of the Peripheral Nerves of the Upper Extremity

- Nerves of plexus
- Primary branches
- Secondary branches
- Function
Figure 4 (Page 52)

Dermatomes of the Upper Limb
Table 13. Spinal Nerves

<table>
<thead>
<tr>
<th>Spinal Nerve</th>
<th>Sensory</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5</td>
<td>5%</td>
<td>30%</td>
</tr>
<tr>
<td>C6</td>
<td>8%</td>
<td>35%</td>
</tr>
<tr>
<td>C7</td>
<td>5%</td>
<td>35%</td>
</tr>
<tr>
<td>C8</td>
<td>5%</td>
<td>45%</td>
</tr>
<tr>
<td>T1</td>
<td>5%</td>
<td>20%</td>
</tr>
</tbody>
</table>

*See Table 3 (p. 20) to convert upper extremity impairments to whole-person impairments.
†See Table 11a (p. 48) to grade impairment from loss of function due to sensory deficit or pain.
‡See Table 12a (p. 49) to grade impairment from loss of function due to motor deficit.
# Table 14. Brachial Plexus (Page 52)

<table>
<thead>
<tr>
<th></th>
<th>Due to sensory deficit or pain †</th>
<th>Due to motor deficit ‡</th>
<th>Due to combined motor and sensory deficits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brachial plexus (C5 through C8, T1)</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Upper trunk (C5, C6), Erb-Duchenne</td>
<td>25</td>
<td>75</td>
<td>81</td>
</tr>
<tr>
<td>Middle trunk (C7)</td>
<td>5</td>
<td>35</td>
<td>38</td>
</tr>
<tr>
<td>Lower trunk (C8, T1), Dejerine-Klumpke</td>
<td>20</td>
<td>70</td>
<td>76</td>
</tr>
</tbody>
</table>

*See Table 3 (p. 20) for converting upper extremity impairments to whole-person impairments.

†See Table 11a (p. 48) to grade impairment from loss of function due to sensory deficit or pain.

‡See Table 12a (p. 49) to grade impairment from loss of function due to motor deficit.
Table 15 (Page 54)

Maximum Upper Extremity Impairments

<table>
<thead>
<tr>
<th>Nerve</th>
<th>Maximum % upper extremity impairment *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Due to sensory deficit or pain †</td>
</tr>
<tr>
<td>Pectorals (medial and lateral)</td>
<td>0</td>
</tr>
<tr>
<td>Axillary</td>
<td>5</td>
</tr>
<tr>
<td>Dorsal scapular</td>
<td>0</td>
</tr>
<tr>
<td>Long thoracic</td>
<td>0</td>
</tr>
<tr>
<td>Medial antebrachial cutaneous</td>
<td>5</td>
</tr>
<tr>
<td>Medial brachial cutaneous</td>
<td>5</td>
</tr>
<tr>
<td>Median (above midforearm)</td>
<td>38</td>
</tr>
<tr>
<td>Median (anterior interosseous branch)</td>
<td>0</td>
</tr>
<tr>
<td>Median (below midforearm)</td>
<td>38</td>
</tr>
<tr>
<td>Radial palmar digital of thumb</td>
<td>7</td>
</tr>
<tr>
<td>Ulnar palmar digital of thumb</td>
<td>11</td>
</tr>
<tr>
<td>Radial palmar digital of index finger</td>
<td>5</td>
</tr>
<tr>
<td>Ulnar palmar digital of index finger</td>
<td>4</td>
</tr>
<tr>
<td>Radial palmar digital of middle finger</td>
<td>5</td>
</tr>
<tr>
<td>Ulnar palmar digital of middle finger</td>
<td>4</td>
</tr>
<tr>
<td>Radial palmar digital of ring finger</td>
<td>2</td>
</tr>
<tr>
<td>Musculocutaneous</td>
<td>5</td>
</tr>
<tr>
<td>Radial (upper arm with loss of triceps)</td>
<td>5</td>
</tr>
<tr>
<td>Radial (elbow with sparing of triceps)</td>
<td>5</td>
</tr>
<tr>
<td>Subscapulars (upper and lower)</td>
<td>0</td>
</tr>
<tr>
<td>Suprascapular</td>
<td>5</td>
</tr>
<tr>
<td>Thoracodorsal</td>
<td>0</td>
</tr>
<tr>
<td>Ulnar (above midforearm)</td>
<td>7</td>
</tr>
<tr>
<td>Ulnar (below midforearm)</td>
<td>7</td>
</tr>
<tr>
<td>Ulnar palmar digital of ring finger</td>
<td>2</td>
</tr>
<tr>
<td>Radial palmar digital of little finger</td>
<td>2</td>
</tr>
<tr>
<td>Ulnar palmar digital of little finger</td>
<td>3</td>
</tr>
</tbody>
</table>

Which would you use for median nerve involvement due to carpal tunnel?
All nerves must be graded according to the loss

- **Motor** - Table 12 (49) or Table 21 (151)
- **Sensation** - Table 11 (48) or Table 20 (151)
Motor strength determination

Motor strength determined by gross resistance testing of the affected nerve
Motor Grading

- 5  Active movement against gravity with full resistance (0% deficit)
- 4  Active movement against gravity with some resistance (1-25% deficit)
- 3  Active movement against gravity only, without resistance (26-50% deficit)
- 2  Active movement with gravity (51-75% deficit)
- 1  Slight contraction and no movement (76-99% deficit)
- 0  No contraction (100% deficit)
Total motor loss

The percentage grade of the motor deficit x maximum loss of strength for the nerve identified = total motor loss
Sensation Grading

1. No loss of sensibility, abnormal sensation or pain (0% sensory deficit)
2. Decreased sensibility with or without abnormal sensation or pain, which is forgotten during activity (1 - 25%)
3. Decreased sensibility with or without abnormal sensation or pain, which interferes with activity (25-60%)
Sensation Grading

4  Decreased sensibility with or without abnormal sensation or pain, which may prevent activity, and/or minor causalgia (61 - 80%)

5  Decreased sensation with abnormal sensations and severe pain, which prevents activity, and/or major causalgia (81 - 100%)
Total Sensory Loss

Percentage grade of the sensation deficit x maximum loss of sensation for the nerve identified
= total sensation loss
Combine

The sensation and motor nerve deficits are combined

Total nerve deficit is combined with other deficits

Combined Values Chart, p. 322
Notes: Loss of strength may be evaluated according to grip and lateral pinch strength. A patient cannot be given a rating for a motor deficit due to a neurological cause under Table 12 and also receive a grip strength rating.
Case Example

35 y/o legal secretary develops carpal tunnel syndrome. One year after a carpal tunnel release the patient is able to work full time with modifications. She continues to have complaints of numbness, complains of weakness, and cannot knit.
Case Example

Her physical findings are:

- mild thenar atrophy
- 4/5 thumb to middle finger opposition
- Decreased sensation and 2 point discrimination of 9 mm on the first 3 digits
What is her whole person impairment?

A - 2% Whole Person
B - 5% Whole Person
C - 10% Whole Person
D - 12% Whole Person
Reflex Sympathetic Dystrophy

Three factors should be present:

- Diffuse pain usually described as burning and severe in nature
- Autonomic dysfunction
- Loss of function of the affected part
To Rate RSD Consider

- Range of motion deficits in affected limbs
- Sensory deficit
- Motor deficit
Table 17 (Page 57) Impairment of Upper Extremity Due to Peripheral Vascular Disease

- Factors considered:
  - claudication
  - pain at rest
  - edema
  - use of elastic supports
  - ulceration
  - Raynaud’s syndrome
  - control with treatment
- Combine with other impairments
3.1 m Impairment Due to Other Disorders of the Upper Extremity

- To be used only when the previous measures of impairment do not adequately address the patient’s loss of function

- N.B. These are uncommon, for the most part only be familiar that they exist, and reference as needed.
Impairment Due to Other Disorders of the Upper Extremity

- Bone and Joint Deformities
- Musculotendinous Impairments
- Strength Evaluation
Bone and Joint Deformities

- Joint crepititation with motion
- Joint swelling due to synovial hypertrophy
- Digit lateral deviation
- Digit rotational deformity
- Persistent joint subluxation or dislocation
- Joint instability
- Wrist and elbow joint radial and ulnar deviations
- Carpal instability
- Arthroplasty
Table 18. Impairment Values for Digits, Hand, Upper Extremity, and the Whole Person for Disorders of Specific Joints.

<table>
<thead>
<tr>
<th>Units and joints</th>
<th>% impairment of</th>
<th>Unit</th>
<th>Hand</th>
<th>Upper extremity</th>
<th>Whole person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shoulders</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glenohumeral</td>
<td>60</td>
<td>25</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Acromioclavicular</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elbow</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire elbow</td>
<td>70</td>
<td>42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ulnohumeral</td>
<td>50</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal</td>
<td>20</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>radioulnar</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire wrist</td>
<td>60</td>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiocarpal</td>
<td>40</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>20</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>radioulnar</td>
<td>30</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>carpal row</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire hand</td>
<td>90</td>
<td>54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thumb</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire thumb</td>
<td>100</td>
<td>40</td>
<td>36</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Carpmetacarpal</td>
<td>75</td>
<td>30</td>
<td>27</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Metacarpo-</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>phalangeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interphalangeal</td>
<td>15</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Index and middle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire finger</td>
<td>100</td>
<td>20</td>
<td>18</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Metacarpo-</td>
<td>100</td>
<td>20</td>
<td>18</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>phalangeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal</td>
<td>80</td>
<td>16</td>
<td>14</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>interphalangeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>45</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>interphalangeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ring or little</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entire finger</td>
<td>100</td>
<td>10</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Metacarpo-</td>
<td>100</td>
<td>10</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>phalangeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proximal</td>
<td>80</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>interphalangeal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distal</td>
<td>45</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Never used alone, always used with a multiplier
Joint Crepitation with Motion

- May reflect synovitis or cartilage degeneration
- Use Table 19, p. 59, Impairment from Joint Crepitation
  - mild: inconstant during active ROM (10% of joint)
  - moderate: constant during active ROM (20% joint)
  - severe: constant during passive ROM (30% of joint)
- Multiply by Impairment Value for Joints, Table 18, p. 58
## Table 19. Impairment from Joint Crepitation.

<table>
<thead>
<tr>
<th>Crepitation severity</th>
<th>% Joint impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild: inconstant during active range of motion</td>
<td>10</td>
</tr>
<tr>
<td>Moderate: constant during active range of motion</td>
<td>20</td>
</tr>
<tr>
<td>Severe: constant during passive range of motion</td>
<td>30</td>
</tr>
</tbody>
</table>
Case Example

- Injury to the PIP joint of the ring finger
- Normal range of motion, inconstant crepitation of the PIP
- What is the impairment, expressed as whole person?
  A - 1% Whole Person
  B - 2% Whole Person
  C - 3% Whole Person
  D - 4% Whole Person
Joint Swelling Due to Synovial Hypertrophy

• Usually estimated through loss of motion
• Use Table 20, p. 59, Impairment from Synovial Hypertrophy
  • mild: visibly apparent (10% of joint)
  • moderate: palpably apparent (20% of joint)
  • severe: greater than 10% increase in size (30% of joint)
• Multiply by Impairment Value for Joints, Table 18, p. 58
Digital Lateral Deviation or Rotational Deformity

- Use Table 21, p. 59, Impairment from Digit Ulnar or Radial Deviation
  - measured in degrees during maximum active extension
- or Use Table 22, p. 59, Digit Rotational Deformity
  - measured in degrees during maximum active flexion
- Multiply by the total value of the digit (Table 18, p. 58)
- If other impairments are present, combine this value with them
Persistent Joint Subluxation and Dislocation without Motion Deficits

- When persistent joint subluxation or dislocation results in restricted motion, impairment percents are given only for lack of motion
- Use Table 23, p. 60, Impairment from Persistent Joint Subluxation or Dislocation
  - mild: can be completely reduced manually (20% joint impairment)
  - moderate: cannot be completely reduced manually (40%)
  - severe: cannot be reduced (60%)
- Multiply by Impairment Value for Joints, Table 18, p. 58
Joint Instability

- Excessive passive mediolateral motion is evaluated by comparing with normal joint stability
- Use Table 24 (60), Impairment from Joint Mediolateral Instability
  - mild: less than 10 degrees (20% joint impairment)
  - moderate: 10 to 20 degrees (40% joint impairment)
  - severe: greater than 20 degrees (60% joint impairment)
- Multiply by Impairment Value for Joints, Table 18 (58)
Wrist and Elbow Joint Lateral Deviation

- Measure with wrist or elbow in maximum extension
- Use Table 25 (Page 60), Impairments from Wrist and Elbow Joint Radial and Ulnar Deviations
  - mild: less than 20 degrees (10% joint impairment)
  - moderate: 20 to 30 degrees (20% joint impairment)
  - severe: greater than 30 degrees (30% joint impairment)
- Multiply by Impairment Value for Joints, Table 18 (Page 58)
Carpal Instability

- Carpal instability patterns resulting from lunate or scaphoid abnormalities
- Use Table 26 (Page 61), Upper Extremity Impairment Due to Carpal Instability Patterns
  - Based on radiographic findings
  - Use the largest impairment
- May be combined with carpal bone resection or arthroplasty only
Arthroplasty

- Simple resection arthroplasty is given 40% impairment of the joint value
- Implant arthroplasty is given 50% impairment of the joint value
- Use Table 27 (Page 61), Impairment of the Upper Extremity After Arthroplasty of Specific Bones or Joints
- Values may be combined with range of motion deficits
- Do not use for arthodesis
Musculotendinous Impairments

- Intrinsic tightness
- Constrictive tenosynovities
- Extensor tendon subluxation at the MP joint
- Other musculoskeletal system defects
Intrinsic Tightness Severity Without Range of Motion Deficit

- Bunnell’s test - Passive flexion of the PIP joint with MP joint hyperextended
- Use Table 28 (Page 63), Impairment from Intrinsic Tightness
  - Mild: PIP flexion 80 to 60 degrees (20% digit impairment)
  - Moderate: PIP flexion 59 to 20 degrees (40% digit impairment)
  - Severe: PIP flexion less than 20 degrees (60% digit impairment)
- Multiply by Impairment Value for Joints, Table 18 (Page 58)
- Combine with other impairments of the same digit
Constrictive Tenosynovitis Without Range of Motion Deficit

- Use Table 29 (Page 63), Impairment Due to Constrictive Tenosynovitis
  - Mild: Inconstant triggering during active range of motion (20% digit impairment)
  - Moderate: Constant triggering during active range of motion (40% digit impairment)
  - Severe: Constant triggering during passive range of motion (60% digit impairment)
- Multiply by Impairment Value for Joints, Table 18 (Page 58)
- Combine with other impairments of the same digit
Extensor Tendon Subluxation at the MP Joint

- Use Table 30 (Page 63) Impairment Due to Extensor Tendon Subluxation
  - Mild: Ulnar tendon subluxation on MP joint flexion only (10% digit impairment)
  - Moderate: Reducible tendon subluxation in the intermetacarpal groove (20% digit impairment)
  - Severe: Nonreducible tendon subluxation in the intermetacarpal groove (30% digit impairment)

- Multiply by Impairment Value for Joints, Table 18 (Page 58)
- Combine with other impairments of the same digit
Other Defects

- In a rare case

- If the examiner feels that the calculated rating does not reflect the patient’s impairment, the rating can be increased with a report describing the reasons
Loss of Strength

- Table 31 - 34 (64 - 65)

- This section should be used only when loss of strength cannot be adequately rated using the other sections, including neurological motor deficit.
Loss of Strength Measurements

- Grip strength measurements taken with a Jamar dynamometer
- Pinch strength measurements taken with pinch gauge
- Repeated at intervals during an examination
• 3 reliable measurements with less than 20% variation

• Maximal effort determinations
  • Bell shape curve
  • Rapid exchange grip

• A patient cannot receive an impairment for both grip and pinch
Strength Loss Index

(Strength of the normal hand minus the strength of the abnormal hand) divided by (Strength of the normal hand)
Table 34. Upper Extremity Impairment for Loss of Strength.

<table>
<thead>
<tr>
<th>% Strength Loss Index</th>
<th>% Upper extremity impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 - 30</td>
<td>10</td>
</tr>
<tr>
<td>31 - 60</td>
<td>20</td>
</tr>
<tr>
<td>61 - 100</td>
<td>30</td>
</tr>
</tbody>
</table>
Example of Grip Strength

<table>
<thead>
<tr>
<th>Trial #</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>Ave.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right hand</td>
<td>50</td>
<td>60</td>
<td>52</td>
<td>54</td>
</tr>
<tr>
<td>Left hand</td>
<td>90</td>
<td>103</td>
<td>84</td>
<td>92</td>
</tr>
</tbody>
</table>
Combining Regional Impairments to Obtain Impairment of the Whole Person
**Process**

- Determine the impairments of each region (hand, wrist, elbow, and shoulder joints)

- Use to the Combined Values Chart to combine

- Convert to whole person
Summary of Upper Extremity Impairment Steps

- Hand Region
  Rate involved digit
  - amputation
  - sensation
  - range of motion (thumb joints add, others combine)
  - other disorders
  - combine
  - convert to hand
  - add the hand impairments for all digits
Summary

- Convert hand impairment to upper extremity impairment

- If not other upper extremity impairments, convert to whole person
Summary

- Wrist region
  - Determine range of motion and other disorder impairments
  - Combine

- Elbow region
  - Determine range of motion and other disorder impairments
  - Combine

- Shoulder region
  - Determine range of motion and other disorder impairments
  - Combine
Summary

- Determine amputation impairment, and combine
- Determine impairment due to peripheral neuropathy, entrapment, causalgia, or RSD, and combine
- Determine peripheral vascular impairment, and combine
- Determine impairment due to other disorders, and combine
Summary

- Convert upper extremity impairment to whole person impairment

- When both upper extremities involved, combine
Love me or Hate me,  
both are in my favour... If you Love me,  
I’ll always be in your Heart...  
If you Hate me,  
I’ll always be in your Mind...  

- William Shakespeare
Thanks For Your Attention

SAY SOMETHING NICE TO EVERYONE YOU MEET TODAY! IT’LL DRIVE ‘EM CRAZY!