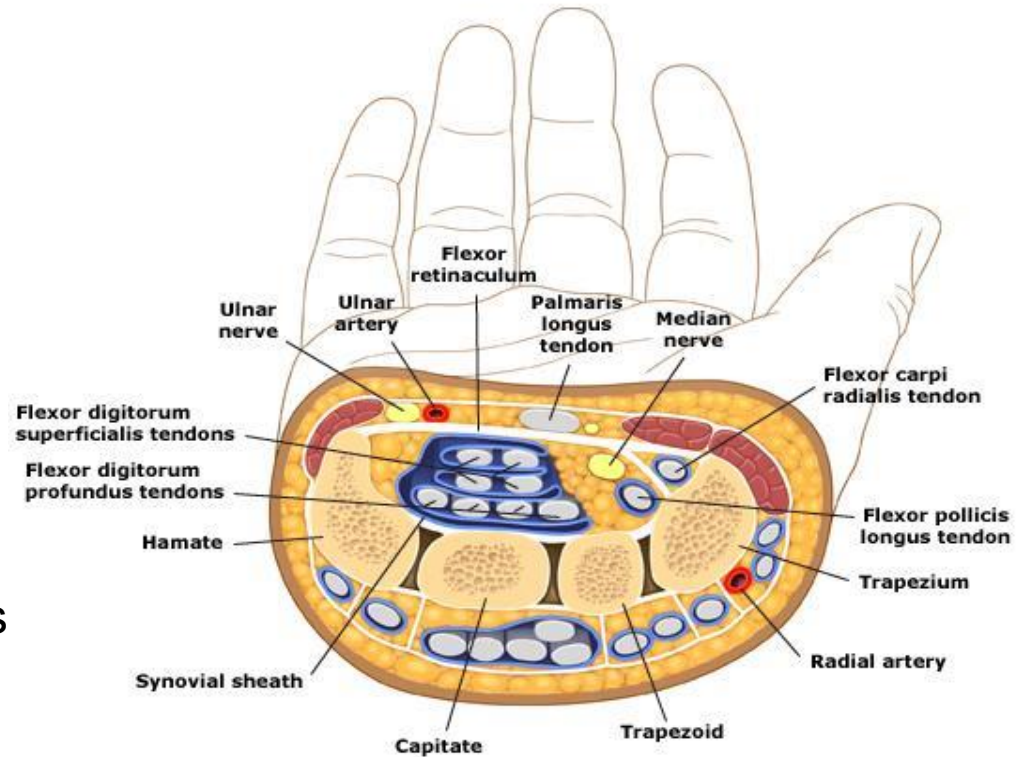


Carpal Tunnel Syndrome

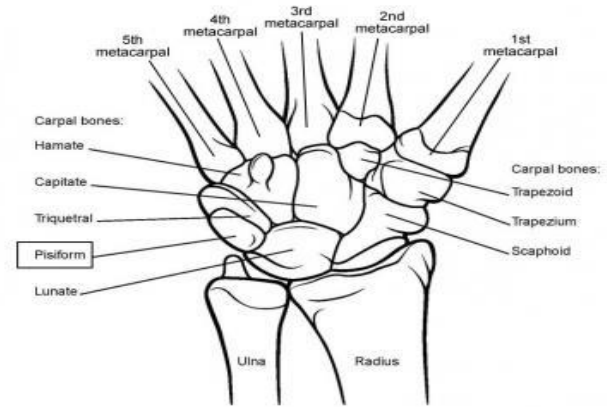
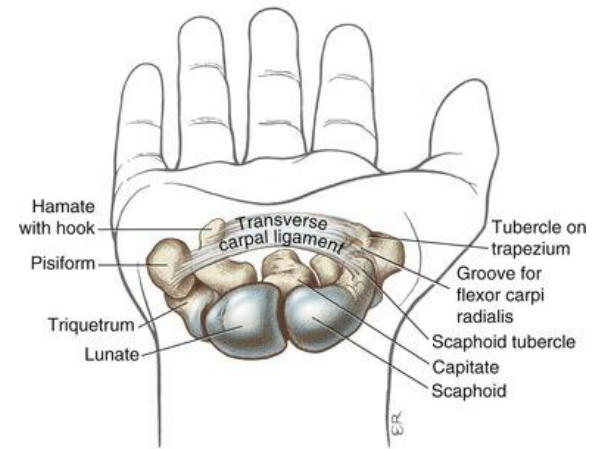
Anatomy of the wrist and hand

- Carpal tunnel
- Flexor retinaculum
- Median nerve
- Carpal bones
 - hamate
 - capitate
 - trapeziod
 - trapezium
- Muscles , tendons
 - flexor digitorum superficialis
 - flexor digitorum profundus
 - flexor pollicis longus
- Median nerve

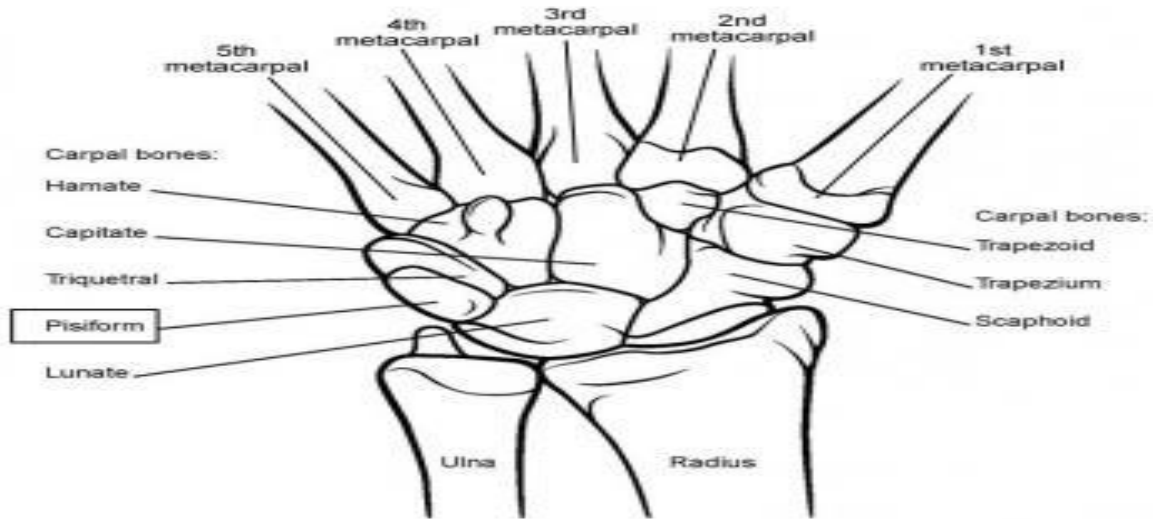


Structure of carpal tunnel bones

- Carpal bones form arch
- Convex on dorsal side
- Concave on palmer side
- Sulcus carpi
- Covered by flexor retinaculum
- Narrowest section of tunnel located 1 cm beyond the mid line of the distal row of the carpal bones



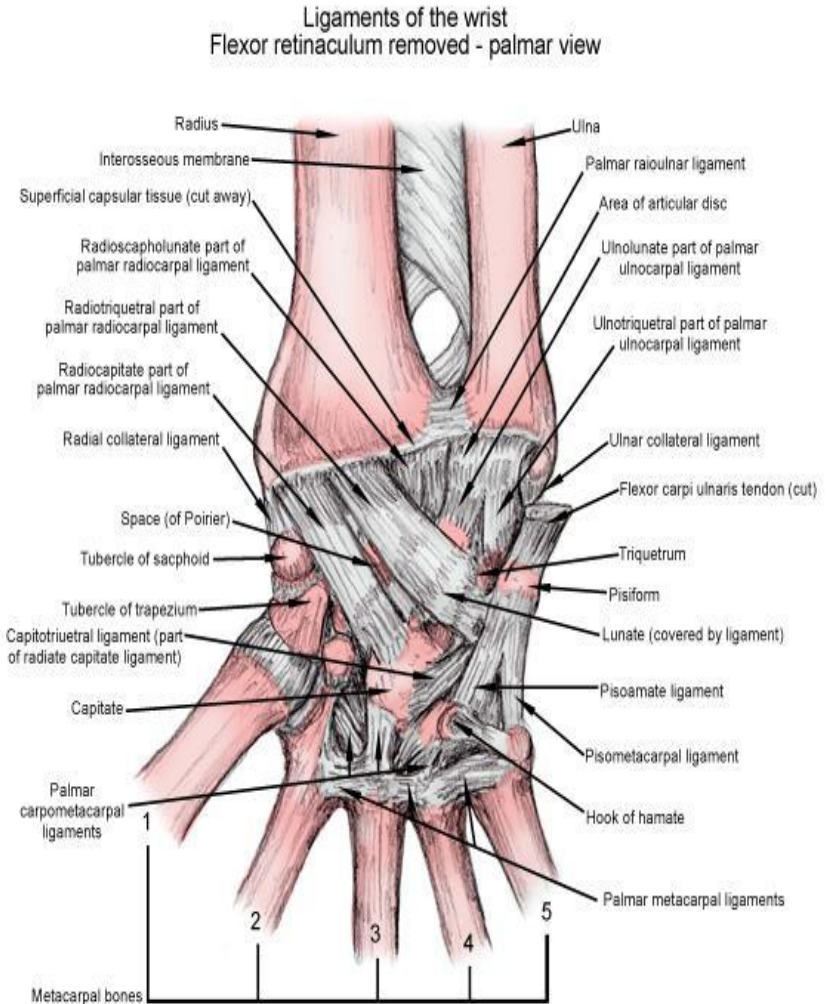
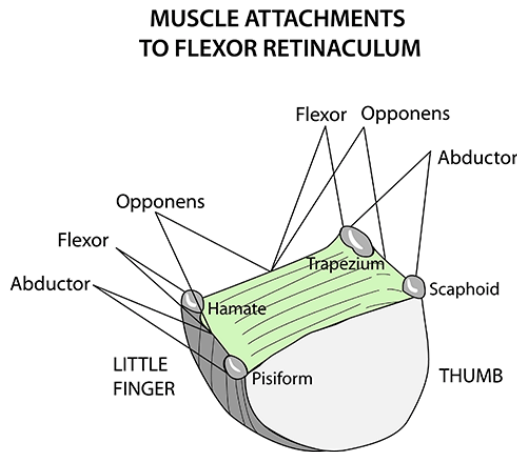
Flexor retinaculum



- Transverse carpal ligament / anterior annular ligament
- Strong fibrous band
- Covers carpal bones on palmer side
- Attaches to radius and ulna
- Ulnar side attaches to pisiform and hook of hamate
- Radial side attaches to tubercle of scaphoid and ridge of trapezium bone

Flexor retinaculum

- Continuous with palmar carpal ligament and deeper palmar aponeurosis
- Ulnar nerve, ulnar artery, cutaneous branches of the median and ulnar nerve pass on top of the retinaculum

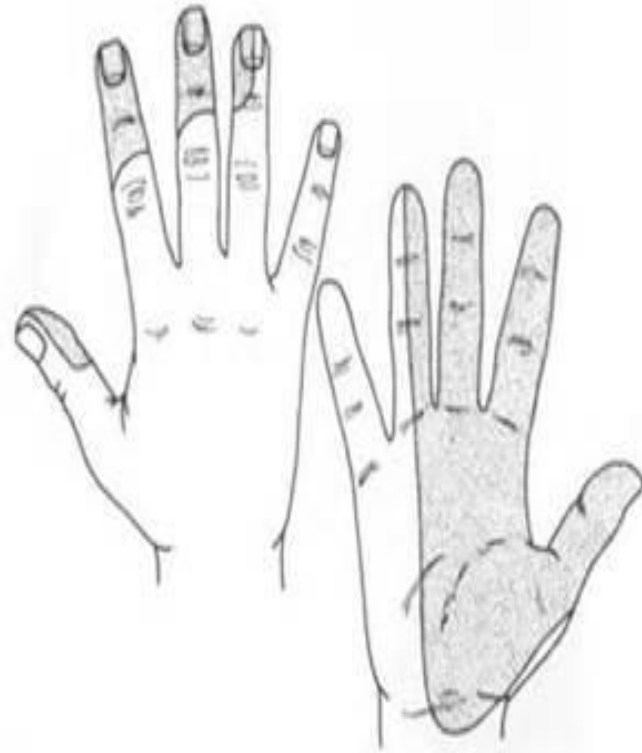


Carpal Tunnel syndrome

- Can be brought on by any factor that increases the pressure within the carpal tunnel
- During pregnancy women experience CTS due to hormonal changes (high progesterone levels) and water retention (which swells the synovium)
- Previous injuries including fractures of the wrist
- Medical conditions that lead to fluid retention or are associated with inflammation such as inflammatory arthritis, Colles fracture, amyloidosis, hypothyroidism, diabetes and use of corticosteroids and estrogens
- Obesity also increases the risk of CTS: individuals classified as obese (BMI > 29) are 2.5 times more likely than individuals with a BMI < 20 to be diagnosed with CTS
- Lack of Vitamin B12
- Mutations in the gene SH3TC2 associated with Charcot Marie Tooth demonstrates susceptibility to neuropathy including CTS

Carpal tunnel syndrome

- Can be brought on by any factor that increases the pressure within the carpal tunnel
- Carpal tunnel syndrome is compression of the median nerve as it passes through the carpal tunnel at the wrist
- The main symptoms are pain, numbness and pins and needles affecting the thumb, index finger & middle finger
- Typically symptoms are worse at night
- Grip strength may be effected & could result in thenar wasting



Thenar eminence

- Adductor pollicis brevis abducts the thumb
- Flexor pollicis brevis flexes the thumb
- Opponens pollicis opposes the thumb
- Adductor pollicis rotates the thumb and opposes
- It is not a muscle of the thenar group
- Supplied by the ulnar nerve
- Long term compression of medial nerve can cause thenar wasting



Ulnar tunnel

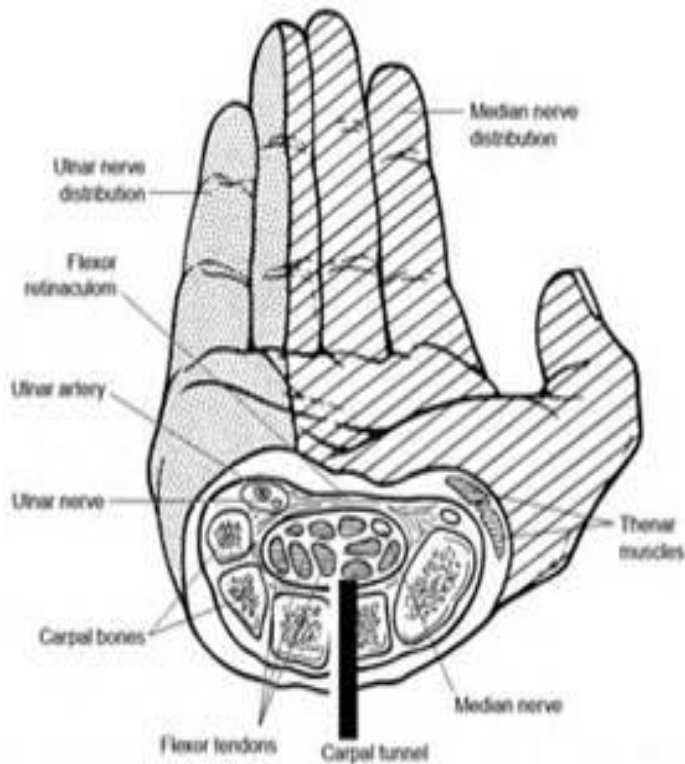


Figure 1. Anatomic cross section of the carpal tunnel. Median nerve (hatched area) and ulnar nerve (stippled area) innervation is shown.

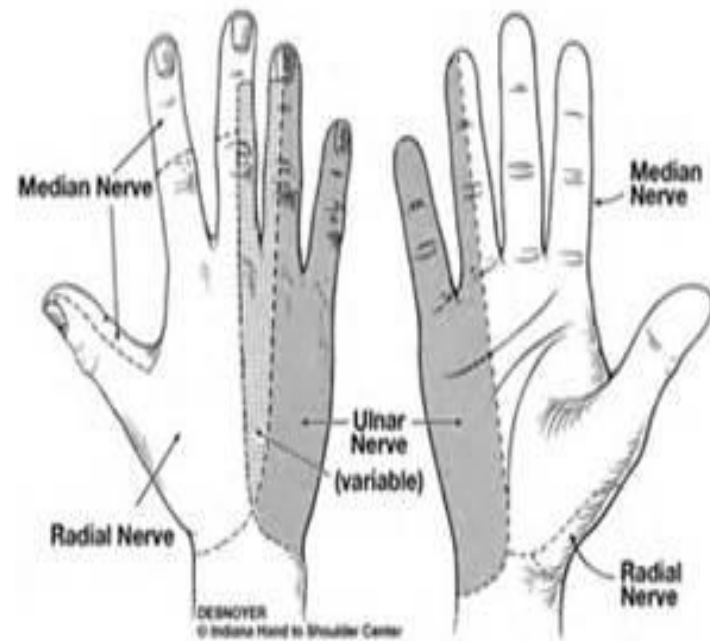
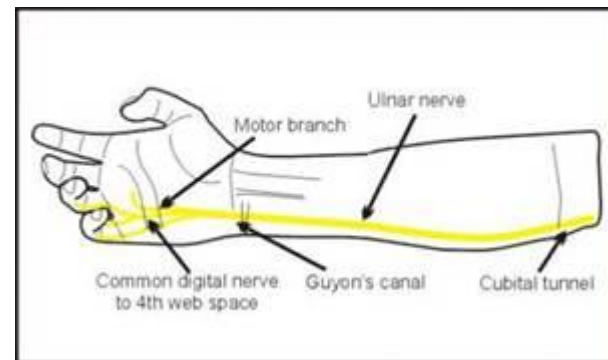


Fig. 2: Areas of ulnar nerve sensation.

Ulnar tunnel

- Longitudinal canal in wrist allowing passage of ulnar nerve & ulnar artery
- Roof of canal made up of superficial palmer carpal ligament
- Floor of canal made up from deeper flexor retinaculum & hypothenar muscles
- Medially formed by pisiform & pisohamate on ulnar side and hook of hamate on the radial side
- 4 cm long



Assessment Hemms questionnaire

- **Scoring System for CTS, Guidelines for use** The “Victoria questionnaire” is designed to aid in the assessment of patients referred to a Hand Clinic with paraesthesia in the hand (Tingling hands). Although it is orientated to patients with suspected carpal tunnel syndrome, it provides a useful structure for recording the symptoms in patients suspected of having other causes of nerve compression, most commonly ulnar nerve entrapment.
- Although there is high correlation of scores with a diagnosis of CTS, clinical judgement should be exercised in the deciding whether to recommend operation or further investigation (usually nerve conduction studies). Some indications for NCS, regardless of the score, are mentioned below.
- Page 1 should be completed by the patient without the doctor/ESP present. Once the patient has had sufficient time the completeness should be checked and details discussed with the patients.
- Page 2 is for completion by the doctor/ESP. A score for the symptoms and examination findings is recorded.

Hemms questionnaire guidelines page 1

- **1. Age: ()**
Sex: **Male**
Female
- **2. Occupation:.....**
- **4. Are you right or left handed ?**
Right **Left**
Both
- **3. Do you have diabetes?**
Yes
No
- Questions 1, 2 and 4: Record basic background information.
- Manual occupation, particularly in men, is regarded as strong indication for requesting NCS.
- Scoring: 2 points are given for age<60. The rationale for this is that younger patients usually present with more 'classic' symptoms of CTS.
- Question 3: History of diabetes. Currently we arrange NCS in all diabetic patients with suspected CTS. However, experience suggests that those diabetic patients who have typical clinical features of CTS, almost invariably do have CTS, although they may also have diabetic neuropathy. Carpal tunnel release is usually indicated.

Hemms questionnaire guidelines page 1

- **5. What kind of problems do you have with your hands? (Please circle)**
 - **Pain**
 - Pins and Needles**
 - Numbness**
- **6. Are symptoms worse in one hand than the other? Right Left**
 - Both**
- Question 5: This is an open question.
- If the patient description includes tingling or numbness (or similar words) in the hand then the remainder of the questionnaire is scored.
- If different symptoms are recorded then the remainder of the questionnaire should not be scored.
- Question 6: Records which side is affected or which is worse.

Hemms questionnaire guidelines page 1

- **7. Are symptoms worse at any of the of the following times?**
- **During the night**
 - First thing in the morning**
 - While driving**
- **While or after working with hands**
 - While holding the phone**
- **Other** _____
- Question 7: Information on when symptoms are worse and precipitating factors. Patients can tick any number of boxes.
- Currently, points are given only for nocturnal exacerbation of symptoms: 2 points for “During the night” or 1 point for “First thing in the morning”. It is assumed that patients who wake in the morning with numbness and paraesthesia have nocturnal exacerbation but it is not severe enough to wake them during the night.

Hemms questionnaire guidelines page 1

- **9. If you are woken in the night by the symptoms can they be relieved by**
 - **shaking the hand ?** **Yes**
 No
 - **holding it out of bed?** **Yes**
 No
- **10. If you have been given a splint to wear on the wrist, does this alleviate the symptoms?**
 - Yes** **No**
 - No splint given**
- Question 9: Relief of numbness and paraesthesia at night. This question explores the classic description, given by patients with carpal tunnel syndrome, of shaking the hand out of bed (2 points).
- Question 10: Relief by a night splint. Typically symptoms of CTS are improved by a wrist splint usually worn at night (1 point).

Hemms questionnaire guidelines page 1

- **10. If you have been given a splint to wear on the wrist, does this alleviate the symptoms?**

Yes No

No splint given

- **11. Do you tend to drop objects or have your hands become more clumsy?**

• Yes

No

- Question 10: Relief by a night splint. Typically symptoms of CTS are improved by a wrist splint usually worn at night (1 point).
- Question 11: Many patients with CTS describe, “clumsiness”, dropping objects or other examples of reduced manual dexterity (1 point).

Hemms questionnaire guidelines page 1

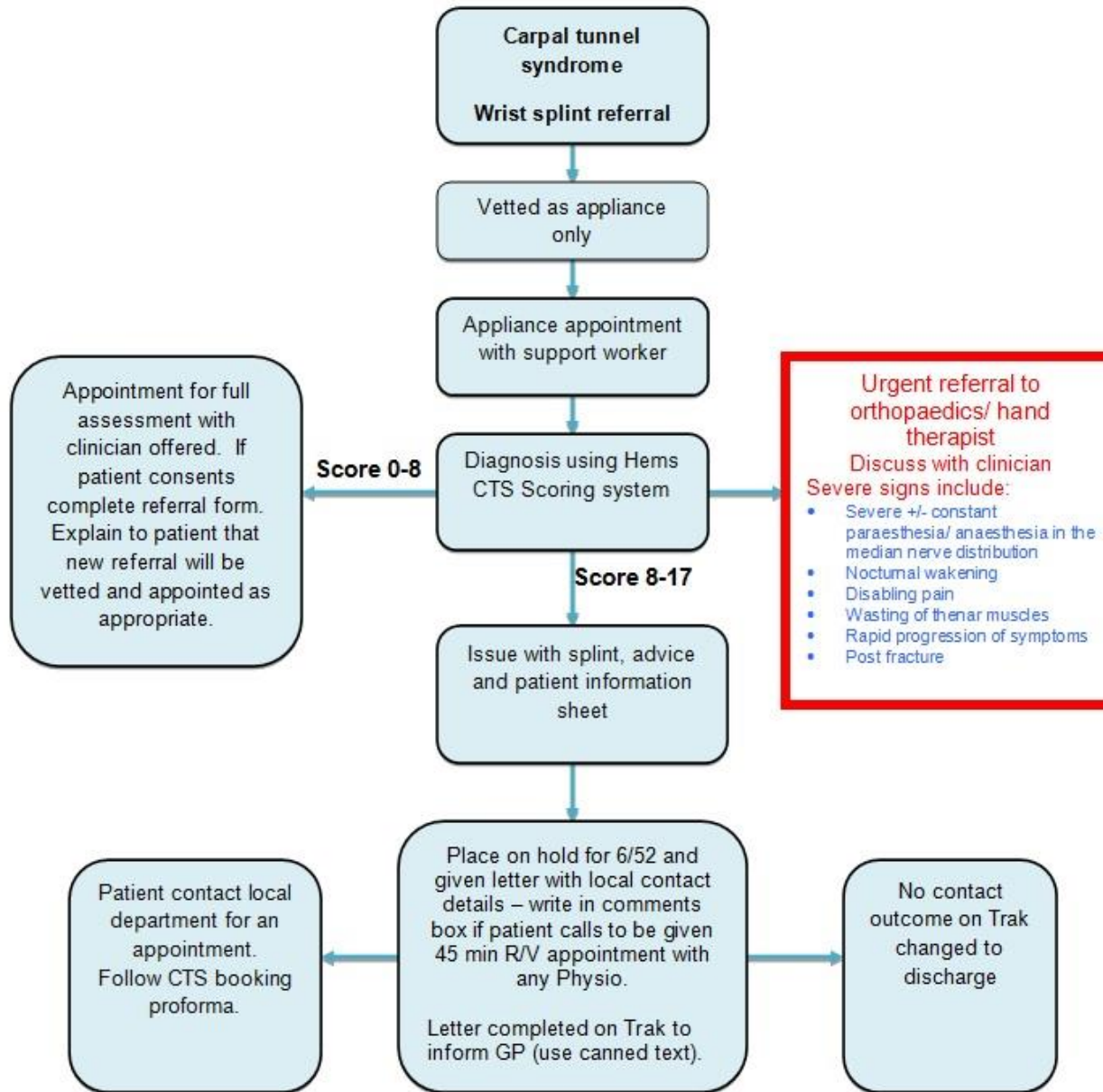
- **12. How long have the symptoms been present?**
- **0-3 Months** **3-6 months**
6-12 months **longer than 12 months**
- **13. Have you been exposed to vibrating tools in your work?**
Yes **No**
- Question 12: Records the length of time symptoms have been present. This is usually at least 6 months as a result of NHS waiting lists.
- Question 13: Records occupational exposure to vibration. Current or recent exposure to vibration raises the possibility of Hand Arm Vibration Syndrome, which has significant implications on the indications for operation. NCS should always be arranged in such cases.

Hemms questionnaire guidelines page 2

- **Paraesthesia in the Ulnar Nerve distribution:**
- (This should probably be changed to, “Clinical features of ulnar nerve entrapment”. The examiner should check whether the patient has numbness/paraesthesia in the ring and little fingers and/or clinical signs of ulnar nerve pathology (Tinel’s +ve over ulnar nerve at the elbow, altered sensation in the ring and little fingers, or weakness of ulnar nerve innervated intrinsic muscles.
- Study results suggest that the presence of any of these features increases the probability that the patient does not have carpal tunnel syndrome and is therefore an indication for NCS.
- **Evidence of cervical root irritation:**
- The examiner should assess whether the patient has symptoms or signs which may indicate nerve root irritation. Eg. Neck pain radiating into the arm/hand, Paraesthesia in the arm/hand when moving the neck. This may be an indication for NCS, C-spine X-ray or C-spine MRI.
- In general the diagnosis of cervical nerve irritation/compression is not usually confused with CTS, as the symptoms are sufficiently different.

Hemms questionnaire guidelines page 2 Signs

- **Tinels sign:** For Median nerve at the carpal tunnel. Percussion over the carpal should cause paraesthesia in the median nerve distribution, most commonly strongest in the middle finger (2 points).
- **Phalen's test:** The patient places their elbows on a desk/bench with the forearms upright. The wrists are flexed for 30 to 60 seconds. The test is +ve if paraesthesia in the fingers is precipitated (1 point).
- **Alteration in sensation in distribution of median nerve:**
- Points are only given if sensation in distribution of the median nerve is altered in comparison with the ulnar nerve area. Sensory changes are commonly most marked in the middle finger.
- Usually a simple subjective assessment can be made by touching the middle and little fingers and asking the patient if one is abnormal.
- A more objective quick assessment can be made using 2-point discrimination. However, 2pd is only impaired in patients with very advanced CTS.
- If sensory thresholds can be tested with Semmes Weinstein filaments, this may be a better assessment, but does take longer to perform.



Management

- Patient information leaflet
- Prophylaxis advice
- Applying splint
- On hold letter given to patient to contact local department
- Outcome to be changed from on hold to discharge if no contact made
- Discharge letter standard trak care d/c letter

references

- Slide 1 page 2 adapted practical pain management website <http://www.practicalpainmanagement.com/pain/neuropathic/carpal-tunnel-syndrome/carpal-tunnel-syndrome-0>
- Slide 2 page 3 adapted from website <http://clinicalgate.com/wrist-2/>
- Slide 3 page 3 adapted from website http://www.ict4us.com/r.kuijt/en_carpalbones.htm
- Slide 4 page 4 adapted from website http://www.ict4us.com/r.kuijt/en_carpalbones.htm
- Slide 5 &6 page 5 adapted from website <http://www.proprofs.com/flashcards/story.php?title=structural-anatomy-midterm-upper-limb>
- Slide 7 page 7 adapted from website <https://nervesurgery.wustl.edu/ev/upperextremity/median/Pages/PalmarCutaneousNerve.aspx>
- Slide 8&9 page 8 adapted from website https://en.wikipedia.org/wiki/Carpal_tunnel_syndrome
- Slide 10, 11,12 &13 page 9 adapted from website <http://rheumaknowledgy.com/carpal-tunnel-syndrome-need-to-insert-pic>