

Entitlement Eligibility Guideline

Carpal Tunnel Syndrome

Date reviewed: 25 July 2025

Date created: February 2005

ICD-11 code: 8C10.0

VAC medical code: 35400 Carpal tunnel syndrome

Definition

Carpal tunnel syndrome (CTS) is an entrapment neuropathy of the median nerve. The compression of the median nerve within the carpal tunnel of the wrist impairs sensation and can also affect the strength of the hand.

Note: CTS is distinct from other related disorders such as cumulative trauma disorders, repetitive strain injury of the wrist, or wrist tendinitis. These conditions, although occasionally sharing similar presentations, have different underlying causes from CTS and are considered separate medical conditions for entitlement purposes.

Diagnostic standard

Diagnosis by a qualified medical practitioner (orthopedic surgeon, plastic surgeon, neurologist, family physician), nurse practitioner, or physician assistant (within their scope of practice) is required.

Confirmation of CTS involves relevant investigations including electrophysiological testing, such as nerve conduction studies, and imaging assessments, such as ultrasound or magnetic resonance imaging (MRI) of the wrist.

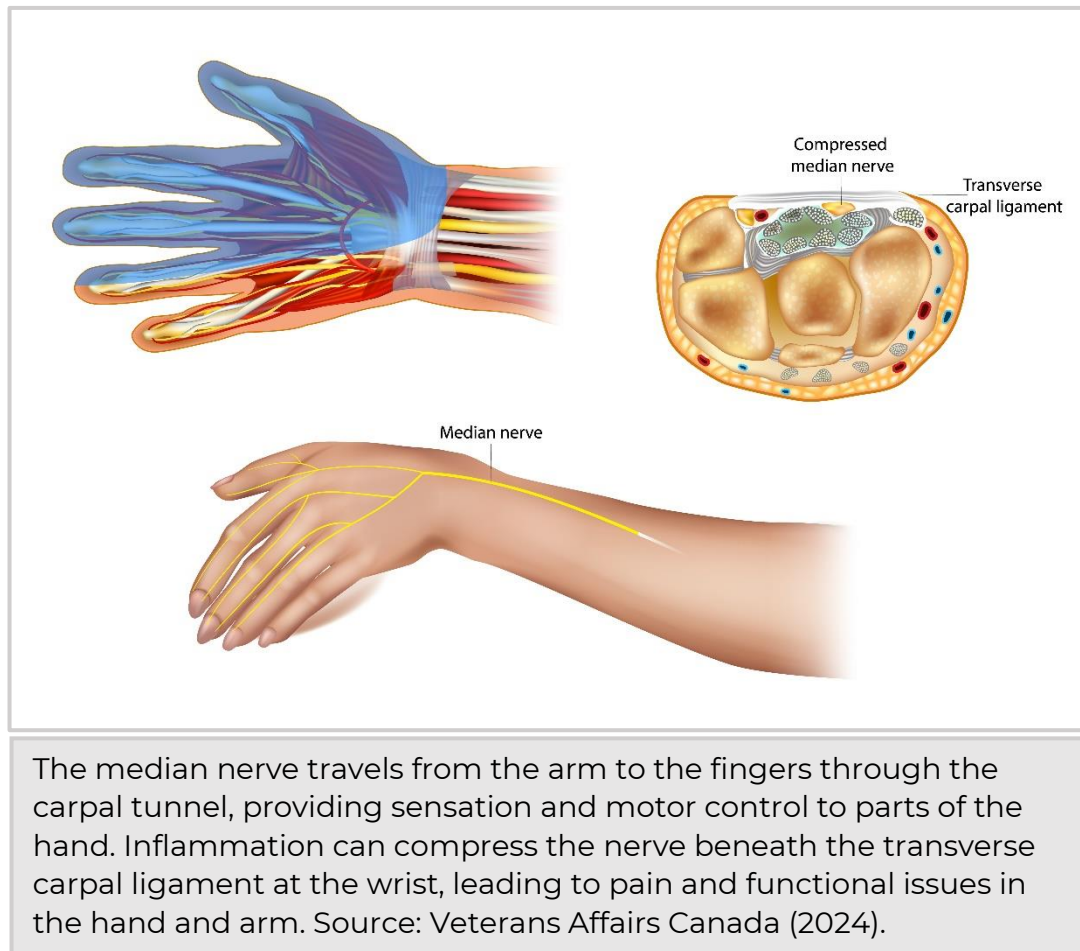
Anatomy and physiology

The carpal tunnel is a narrow, anatomical passageway situated on the palm side of the wrist. It is formed by the wrist bones (carpal bones) on three sides and sealed by a strong band of connective tissue known as the transverse carpal ligament on the fourth side. This confined space accommodates the median nerve and the flexor tendons that bend the fingers ([Figure 1: Carpal tunnel syndrome](#)).

Originating from the brachial plexus in the neck, the median nerve traverses the arm and forearm to enter the hand through the carpal tunnel. It is crucial for providing sensation to the thumb, index, middle, and part of the ring fingers, in addition to supplying motor functions to the thumb's thenar muscles.

Inflammation or injury can lead to a reduction in the tunnel's space or an increase in its contents. This results in compression of the median nerve causing the sensory and motor disturbances characteristic of carpal tunnel syndrome.

Figure 1: Carpal tunnel syndrome



Clinical features

The clinical presentation of carpal tunnel syndrome (CTS) is marked by symptoms affecting the hand and wrist's function and comfort, largely due to compression of the median nerve within the carpal tunnel. Common symptoms include sharp or burning pain, a sensation of the hand 'falling asleep,' or experiencing 'pins and needles,' especially in the thumb, index, middle, and part of the ring fingers. These

symptoms often worsen at night or upon waking, largely attributed to the flexed wrist position during sleep, increasing the pressure within the carpal tunnel.

A notable reduction in hand grip strength and challenges in performing precision-required tasks often lead to difficulties in handling objects securely. Advanced stages of CTS may lead to marked atrophy of the muscles of the base of thumb (thenar eminence), crucial for hand operations.

Diagnostic procedures such as Phalen's maneuver and Tinel's sign are instrumental in reinforcing a CTS diagnosis, providing further clinical evidence.

It has been observed that CTS shows a higher prevalence among females, possibly due to anatomical differences such as a comparatively smaller carpal tunnel area. Furthermore, pregnancy has been identified as a significant risk factor for CTS, although the majority of cases tend to resolve within weeks to months post-partum.

Entitlement considerations

Section A: Causes and/or aggravation

For Veterans Affairs Canada (VAC) entitlement purposes, the following [factors](#) are accepted to cause or aggravate the conditions included in the [Definition section](#) of this EEG, and may be considered along with the evidence to assist in establishing a relationship to service. The factors have been determined based on a review of up-to-date scientific and medical literature, as well as evidence-based medical best practices. Factors other than those listed may be considered, however consultation with a disability consultant or medical advisor is recommended.

The timelines cited below are for guidance purposes. Each case should be adjudicated on the evidence provided and its own merits.

Factors

1. **Overuse:** Performing any combination of **forceful and/or repetitive activities** with the affected hand or forearm for an average of at least eight hours per week for a cumulative period of at least six months before the clinical onset of CTS. If [specified activities](#) have ceased before the clinical onset or aggravation of CTS, then onset or aggravation must have occurred within 30 days of cessation.

Note: Computer use of 28 hours or more per week may aggravate CTS; however, is not considered causative.

Forceful means applying a substantial amount of force or pressure, using the muscles of the hand or forearm.

Repetitive means performing the same or similar hand or forearm movements repeatedly over time.

Specified activities include:

- a) **Repetitive activities** using the affected hand, involving either:
 - bending or twisting of the hand or wrist at least 50 times per hour; or
 - carrying out the same or similar movements in the hand or wrist at least 50 times per hour.
- b) **Forceful activities** generated by the affected hand. This force is applied through:
 - equivalent to lifting or carrying loads of more than three kilograms; or
 - involving lifting or carrying an object in the hand greater than one kilogram in excess of 10 times per hour.
- c) Activities where the affected hand or forearm is **directly vibrated**.
- d) Activities where the affected hand is used for **weight-bearing**.
- e) Activities requiring **extended or extreme positions with excess wrist flexion or extension**:
 - having a flexion/extension angle greater than 45 degrees for a substantial part of the day; or
 - ulnar deviation greater than 20 degrees for a substantial part of the day.

Note: Holding an object in grip or pinch position with extreme posture is an exception, and requires that the position be held for most of the day.

2. Experiencing an **injury to the affected wrist**, other than a wrist fracture, prior to clinical onset or aggravation of CTS. The injury would have had to:
 - alter the normal contour of the carpal tunnel; or
 - damage the median nerve or flexor tendons within the carpal tunnel; or
 - damage the forearm muscles forming the flexor tendons within the carpal tunnel.

For the injury to cause or aggravate CTS, the symptoms of CTS must commence within several months of the injury.

3. Experiencing a **fracture to the affected wrist** prior to clinical onset or aggravation of CTS. The wrist fracture would alter the normal contour of the carpal tunnel, or damage the median nerve or flexor tendons within the carpal tunnel. For the wrist fracture to cause or aggravate CTS, the symptoms must commence within several months of the fracture.

4. **Surgery to the affected wrist** prior to clinical onset or aggravation of CTS. The surgery would have had to alter the normal contour of the carpal tunnel, or damage the median nerve or flexor tendons within the carpal tunnel. For the surgery to cause or aggravate CTS, symptoms must commence within several months of the surgery.
5. Persons with **end stage renal disease on hemodialysis** prior to clinical onset or aggravation of CTS. For hemodialysis to cause or aggravate CTS, it must take place for a period of at least one year immediately before clinical onset or aggravation of CTS. There is no direct evidence that peritoneal dialysis promotes CTS.
6. Having **diabetes mellitus** at the time of clinical onset or aggravation of CTS. People living with diabetic polyneuropathy are at higher risk than diabetics without polyneuropathy.

Note: For diabetes mellitus to cause or aggravate CTS, it must have existed for approximately five years immediately before the clinical onset or aggravation of CTS.

7. Having **edema** involving the affected carpal tunnel at the time of clinical onset or aggravation of CTS. Edema involving the affected carpal tunnel may occur with external burns, fractures, lymphedema, myxedema and animal envenomation.
8. Having **rheumatoid arthritis** involving the affected wrist prior to clinical onset or aggravation of CTS.
9. Having **gout** of the affected wrist prior to clinical onset or aggravation of CTS.
10. Having a **space occupying lesion** of the carpal tunnel prior to clinical onset or aggravation of CTS. The lesion situated within the affected carpal tunnel could include, but is not limited to the following:
 - hemangioma
 - neuroma of the median nerve
 - aneurysm of the median artery
 - calcification
 - synovial sarcoma
 - tendon sheath fibroma
 - lipoma and ganglion.
11. **Pregnancy** prior to clinical onset or aggravation of CTS. While pregnancy may cause or aggravate CTS, CTS caused solely from a pregnancy is generally considered reversible within a few months of the completion of the pregnancy.
12. **Hyperthyroidism**, including treated hyperthyroidism, at the time of clinical onset or aggravation of CTS.

13. Inability to obtain **appropriate clinical management** of CTS.

Section B: Medical conditions which are to be included in entitlement/assessment

Section B provides a list of diagnosed medical conditions which are considered for VAC purposes to be included in the entitlement and assessment of carpal tunnel syndrome. No included medical conditions were identified at the time of the publication of this EEG.

Section C: Common medical conditions which may result, in whole or in part, from carpal tunnel syndrome and/or its treatment

No consequential medical conditions were identified at the time of the publication of this EEG. If the merits of the case and medical evidence indicate that a possible consequential relationship may exist, consultation with a disability consultant or medical advisor is recommended.

Links

Related VAC guidance and policy:

- [Rheumatoid Arthritis – Entitlement Eligibility Guidelines](#)
- [Pain and Suffering Compensation - Policies](#)
- [Royal Canadian Mounted Police Disability Pension Claims - Policies](#)
- [Dual Entitlement – Disability Benefits - Policies](#)
- [Establishing the Existence of a Disability - Policies](#)
- [Disability Benefits in Respect of Peacetime Military Service – The Compensation Principle - Policies](#)
- [Disability Benefits in Respect of Wartime and Special Duty Service – The Insurance Principle - Policies](#)
- [Disability Resulting from a Non-Service Related Injury or Disease - Policies](#)
- [Consequential Disability - Policies](#)
- [Benefit of Doubt - Policies](#)

References as of 22 January 2025

- Andersen, J. H., Thomsen, J. F., Overgaard, E., Lassen, C. F., Brandt, L. P. A., Vilstrup, I., Kryger, A. I., & Mikkelsen, S. (2003). Computer Use and Carpal Tunnel Syndrome: A 1-Year Follow-up Study. *JAMA*, 289(22), 2963. <https://doi.org/10.1001/jama.289.22.2963>
- Anderson, V., Bernard, B., Burt, S. E., Cole, L. L., Estill, C., Fine, L., Grant, K., Gjessing, C., Jenkins, L., Hurrell, J. J., Nelson, N., Pfirman, D., Roberts, R., Stetson, D., Haring-Sweeney, M., & Tanaka, S. (1997). *Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back*.
- Atroshi, I., Gummesson, C., Ornstein, E., Johnsson, R., & Rastam, J. (2007). Carpal tunnel syndrome and keyboard use at work: A population-based study. *Arthritis & Rheumatism*, 56(11), 3620–3625. <https://doi.org/10.1002/art.22956>
- Australian Government Repatriation Medical Authority (2001). Statement of Principles concerning carpal tunnel syndrome (Reasonable Hypothesis) (No. 89 of 2001). [SOPs - Repatriation Medical Authority](#)
- Australian Government Repatriation Medical Authority (2001). Statement of Principles concerning carpal tunnel syndrome (Balance of Probabilities) (No. 90 of 2001). [SOPs - Repatriation Medical Authority](#)
- Australian Government Repatriation Medical Authority (2021). *Statement of Principles concerning carpal tunnel syndrome (Balance of Probabilities)* (No. 94 of 2021). [SOPs - Repatriation Medical Authority](#)

Australian Government Repatriation Medical Authority (2021). *Statement of Principles concerning carpal tunnel syndrome (Reasonable Hypothesis) (No. 93 of 2021)*. [SOPs - Repatriation Medical Authority](#)

Barcenilla, A., March, L. M., Chen, J. S., & Sambrook, P. N. (2012). Carpal tunnel syndrome and its relationship to occupation: A meta-analysis. *Rheumatology*, 51(2), 250–261. <https://doi.org/10.1093/rheumatology/ker108>

Briggs, A. M., Cross, M. J., Hoy, D. G., Sánchez-Riera, L., Blyth, F. M., Woolf, A. D., & March, L. (2016). Musculoskeletal health conditions represent a global threat to healthy aging: A report for the 2015 World Health Organization World Report on Ageing and Health. *The Gerontologist*, 56(Suppl 2), S243–S255. <https://doi.org/10.1093/geront/gnw002>

Calandruccio, J. H., & Thompson, N. B. (2018). Carpal Tunnel Syndrome. *Orthopedic Clinics of North America*, 49(2), 223–229. <https://doi.org/10.1016/j.ocl.2017.11.009>

Canadian Centre for Occupational Health and Safety. *Carpal Tunnel Syndrome*. <https://www.ccohs.ca/oshanswers/diseases/carpal.html#section-3-hdr>

Carpal tunnel syndrome: Clinical manifestations and diagnosis—UpToDate. (n.d.). Retrieved March 26, 2024.

Carpal tunnel syndrome: Pathophysiology and risk factors. UpToDate. (n.d.). Retrieved March 24, 2024.

Cazares-Manríquez, M. A., Wilson, C. C., Vardasca, R., García-Alcaraz, J. L., Olguín-Tiznado, J. E., López-Barreras, J. A., & García-Rivera, B. R. (2020). A Review of Carpal Tunnel Syndrome and Its Association with Age, Body Mass Index, Cardiovascular Risk Factors, Hand Dominance, and Sex. *Applied Sciences*, 10(10), 3488. <https://doi.org/10.3390/app10103488>

- Cecil, R. L., Goldman, L., & Bennett, J. C. (Eds.). (2000). *Cecil textbook of medicine* (21st ed). W.B. Saunders.
- Conlon, C. F., & Rempel, D. M. (2005). Upper Extremity Mononeuropathy Among Engineers: *Journal of Occupational and Environmental Medicine*, 47(12), 1276–1284. <https://doi.org/10.1097/01.jom.0000181748.08188.8b>
- Dale, A. M., Zeringue, A., Harris-Adamson, C., Rempel, D., Bao, S., Thiese, M. S., Merlino, L., Burt, S., Kapellusch, J., Garg, A., Gerr, F., Hegmann, K. T., Eisen, E. A., & Evanoff, B. (2015). General Population Job Exposure Matrix Applied to a Pooled Study of Prevalent Carpal Tunnel Syndrome. *American Journal of Epidemiology*, 181(6), 431–439. <https://doi.org/10.1093/aje/kwu286>
- Deal, J. B., & Magee, A. J. (2020). Carpal Tunnel Syndrome in Military Aviators. *Military Medicine*, 185(9–10), e1506–e1509. <https://doi.org/10.1093/milmed/usaa077>
- Demiryurek, B. E., & Aksoy Gündoğdu, A. (2017). Prevalence of carpal tunnel syndrome and its correlation with pain amongst female hairdressers. *International Journal of Occupational Medicine and Environmental Health*. <https://doi.org/10.13075/ijomeh.1896.01068>
- Dos Santos Bunn, P., De Oliveira Meireles, F., De Souza Sodré, R., Rodrigues, A. I., & Da Silva, E. B. (2021). Risk factors for musculoskeletal injuries in military personnel: A systematic review with meta-analysis. *International Archives of Occupational and Environmental Health*, 94(6), 1173–1189. <https://doi.org/10.1007/s00420-021-01700-3>
- Eleftheriou, A., Rachiotis, G., Varitimidis, S. E., Koutis, C., Malizos, K. N., & Hadjichristodouloul, C. (2012). Cumulative keyboard strokes: A possible risk

- factor for carpal tunnel syndrome. *Journal of Occupational Medicine and Toxicology*, 7(1), 16. <https://doi.org/10.1186/1745-6673-7-16>
- Fagarasanu, M., & Kumar, S. (2003). Carpal tunnel syndrome due to keyboarding and mouse tasks: A review. *International Journal of Industrial Ergonomics*, 31(2), 119–136. [https://doi.org/10.1016/S0169-8141\(02\)00180-4](https://doi.org/10.1016/S0169-8141(02)00180-4)
- Fauci, A. S., Braunwald, E., & Fuselbacher, K. J. (1998). *Harrison's principles of internal medicine* (14th ed). McGraw Hill.
- Garland, F. C., Garland, C. F., Doyle, E. J., Balazs, L. L., Levine, R., Pugh, W. M., & Gorham, E. D. (1996). Carpal Tunnel Syndrome and Occupation in U.S. Navy Enlisted Personnel. *Archives of Environmental Health: An International Journal*, 51(5), 395–407. <https://doi.org/10.1080/00039896.1996.9934428>
- Genova, A., Dix, O., Saefan, A., Thakur, M., & Hassan, A. (2020). Carpal Tunnel Syndrome: A Review of Literature. *Cureus*. <https://doi.org/10.7759/cureus.7333>
- Gilliland, B. C. (1994). Relapsing polychondritis and miscellaneous arthritides. *Harrison's principles of internal medicine* (pp. 1706-1708): McGraw Hill.
- Greathouse, D. G., Root, T. M., Carrillo, C. R., Jordan, C. L., Pickens, B. B., Sutlive, T. G., Shaffer, S. W., & Moore, J. F. (2011). Clinical and electrodiagnostic abnormalities of the median nerve in Army dental assistants before and after training as preventive dental specialists. *U.S. Army Medical Department Journal*, 70–81.
- Haddiya, I., Yacoubi, H., & Bentata, Y. (2018). Why does Carpal Tunnel Syndrome Still Occur in our Chronic Hemodialysis Patients? *Journal of Nephrology & Therapeutics*, 08(03). <https://doi.org/10.4172/2161-0959.1000310>

- Hagberg, M., Morgenstern, H., & Kelsh, M. (1992). Impact of occupations and job tasks on the prevalence of carpal tunnel syndrome. *Scandinavian Journal of Work, Environment & Health*, 18(6), 337–345. <https://doi.org/10.5271/sjweh.1564>
- Hagberg, M., Nyström, A., & Zetterlund, B. (1991). Recovery from symptoms after carpal tunnel syndrome surgery in males in relation to vibration exposure. *The Journal of Hand Surgery*, 16(1), 66–71. [https://doi.org/10.1016/S0363-5023\(10\)80015-2](https://doi.org/10.1016/S0363-5023(10)80015-2)
- Harris-Adamson, C., Eisen, E. A., Neophytou, A., Kapellusch, J., Garg, A., Hegmann, K. T., Thiese, M. S., Dale, A. M., Evanoff, B., Bao, S., Silverstein, B., Gerr, F., Burt, S., & Rempel, D. (2016). Biomechanical and psychosocial exposures are independent risk factors for carpal tunnel syndrome: Assessment of confounding using causal diagrams. *Occupational and Environmental Medicine*, oemed-2016-103634. <https://doi.org/10.1136/oemed-2016-103634>
- Hassan, A., Beumer, A., Kuijer, P. P. F. M., & van der Molen, H. F. (2022). Work-relatedness of carpal tunnel syndrome: Systematic review including meta-analysis and GRADE. *Health Science Reports*, 5(6), e888. <https://doi.org/10.1002/hsr2.888>
- Hatano, M., Kitajima, I., Yamamoto, S., Nakamura, M., Isawa, K., Suwabe, T., Hoshino, J., Sawa, N., & Ubara, Y. (2022). Dialysis-related carpal tunnel syndrome in the past 40 years. *Clinical and Experimental Nephrology*, 26(1), 68–74. <https://doi.org/10.1007/s10157-021-02122-8>
- Hou, W., Hsu, J., Lin, C., & Liang, H. (2007). Carpal tunnel syndrome in male visual display terminal (VDT) workers. *American Journal of Industrial Medicine*, 50(1), 1–7. <https://doi.org/10.1002/ajim.20396>

- Jackson, R., Beckman, J., Frederick, M., Musolin, K., & Harrison, R. (2018). Rates of Carpal Tunnel Syndrome in a State Workers' Compensation Information System, by Industry and Occupation—California, 2007–2014. *MMWR. Morbidity and Mortality Weekly Report*, 67(39), 1094–1097.
<https://doi.org/10.15585/mmwr.mm6739a4>
- Katz, J. N., Larson, M. G., Fossel, A. H., & Liang, M. H. (1991). Validation of a surveillance case definition of carpal tunnel syndrome. *American Journal of Public Health*, 81(2), 189–193. <https://doi.org/10.2105/AJPH.81.2.189>
- Kothari, M. (2024). Carpal tunnel syndrome: Clinical manifestations and diagnosis. *UpToDate*.
- Kothari, M. (2024). Carpal tunnel syndrome : Pathophysiology and risk factors. *UpToDate*.
- Kozak, A., Schedlbauer, G., Wirth, T., Euler, U., Westermann, C., & Nienhaus, A. (2015). Association between work-related biomechanical risk factors and the occurrence of carpal tunnel syndrome: An overview of systematic reviews and a meta-analysis of current research. *BMC Musculoskeletal Disorders*, 16(1), 231.
<https://doi.org/10.1186/s12891-015-0685-0>
- Kuharić, M., & Zibar, L. (2019). Screening for Carpal Tunnel Syndrome in Patients on Chronic Hemodialysis. *Acta Medica Academica*, 48(2), 167.
<https://doi.org/10.5644/ama2006-124.255>
- Lalumandier, J. A., & McPhee, S. D. (2001). Prevalence and risk factors of hand problems and carpal tunnel syndrome among dental hygienists. *Journal of Dental Hygiene: JDH*, 75(2), 130–134.

- Lalumandier, J. A., McPhee, S. D., Riddle, S., Shulman, J. D., & Daigle, W. W. (2000). Carpal tunnel syndrome: Effect on Army dental personnel. *Military Medicine*, 165(5), 372–378.
- Lawson, I. J. (2020). Is carpal tunnel syndrome caused by work with vibrating tools? *Occupational Medicine*, 70(1), 8–10. <https://doi.org/10.1093/occmed/kqz142>
- Lin, S., Lin, C., Hsu, W., Lin, C., Lo, S., & Kao, C. (2021). Risk of idiopathic peripheral neuropathy in end-stage renal disease: A population-based cohort study. *International Journal of Clinical Practice*, 75(1). <https://doi.org/10.1111/ijcp.13641>
- Lovalekar, M., Hauret, K., Roy, T., Taylor, K., Blacker, S. D., Newman, P., Yanovich, R., Fleischmann, C., Nindl, B. C., Jones, B., & Canham-Chervak, M. (2021). Musculoskeletal injuries in military personnel—Descriptive epidemiology, risk factor identification, and prevention. *Journal of Science and Medicine in Sport*, 24(10), 963–969. <https://doi.org/10.1016/j.jsams.2021.03.016>
- Lund, C. B., Mikkelsen, S., Thygesen, L. C., Hansson, G.-Å., & Thomsen, J. F. (2019). Movements of the wrist and the risk of carpal tunnel syndrome: A nationwide cohort study using objective exposure measurements. *Occupational and Environmental Medicine*, 76(8), 519–526. <https://doi.org/10.1136/oemed-2018-105619>
- Maghsoudipour, M., Hosseini, F., Coh, P., & Garib, S. (2021). Evaluation of occupational and non-occupational risk factors associated with carpal tunnel syndrome in dentists. *Work*, 69(1), 181–186. <https://doi.org/10.3233/WOR-213467>
- Mahoney, J. (1995). Cumulative trauma disorders and carpal tunnel syndrome: Sorting out the confusion. *Canadian Journal of Plastic Surgery*, 3(4), 17–25. <https://doi.org/10.1177/229255039500300404>

- Mayo Foundation for Medical Education and Research. (2024). *Carpal tunnel syndrome*. Mayo Clinic. <https://www.mayoclinic.org/diseases-conditions/carpal-tunnel-syndrome/symptoms-causes/syc-20355603>
- McCarty, D. J. (1979). *Arthritis and Allied Conditions: A Textbook of Rheumatology*. Lippincott Williams & Wilkins.
<https://books.google.ca/books?id=jlNsAAAAMAAJ>
- McDiarmid, M., Oliver, M., Ruser, J., & Gucer, P. (2000). Male and Female Rate Differences in Carpal Tunnel Syndrome Injuries: Personal Attributes or Job Tasks? *Environmental Research*, 83(1), 23–32.
<https://doi.org/10.1006/enrs.2000.4042>
- Mediouni, Z., Bodin, J., Dale, A. M., Herquelot, E., Carton, M., Leclerc, A., Fouquet, N., Dumontier, C., Roquelaure, Y., Evanoff, B. A., & Descatha, A. (2015). Carpal tunnel syndrome and computer exposure at work in two large complementary cohorts. *BMJ Open*, 5(9), e008156.
<https://doi.org/10.1136/bmjopen-2015-008156>
- Mediouni, Z., de Roquemaurel, A., Dumontier, C., Becour, B., Garrabe, H., Roquelaure, Y., & Descatha, A. (2014). Is Carpal Tunnel Syndrome Related to Computer Exposure at Work? A Review and Meta-Analysis. *Journal of Occupational & Environmental Medicine*, 56(2), 204–208.
<https://doi.org/10.1097/JOM.0000000000000080>
- Miyasaka, N., Sato, K., Kitano, Y., Higaki, M., Nishioka, K., & Ohta, K. (1992). Aberrant cytokine production from tenosynovium in dialysis associated amyloidosis. *Annals of the Rheumatic Diseases*, 51(6), 797–802.
<https://doi.org/10.1136/ard.51.6.797>

- Nathan, P. A., Keniston, R. C., Myers, L. D., & Meadows, K. D. (1992). Obesity as a risk factor for slowing of sensory conduction of the median nerve in industry. A cross-sectional and longitudinal study involving 429 workers. *Journal of Occupational Medicine.: Official Publication of the Industrial Medical Association*, 34(4), 379–383.
- Neuroscience Specialists. (2022, January 27). *Does consistent typing cause carpal tunnel?*. <https://www.neurosurg.org/blog/does-consistent-typing-cause-carpal-tunnel/?bp=29218>
- Newington, L., Harris, E. C., & Walker-Bone, K. (2015). Carpal tunnel syndrome and work. *Best Practice & Research Clinical Rheumatology*, 29(3), 440–453. <https://doi.org/10.1016/j.berh.2015.04.026>
- Niu, S. (2022). *Diagnostic and Exposure Criteria for Occupational Diseases: Guidance Notes for Diagnosis and Prevention of the Diseases in the ILO List of Occupational Diseases (revised 2010)* (C. Colosio, Ed.). International Labour Organisation.
- O’Leary, T. J., Young, C. D., Wardle, S. L., & Greeves, J. P. (2023). Gender data gap in military research: A review of the participation of men and women in military musculoskeletal injury studies. *BMJ Military Health*, 169(1), 84–88. <https://doi.org/10.1136/bmjmilitary-2021-002015>
- Padua, L., Cuccagna, C., Giovannini, S., Coraci, D., Pelosi, L., Loreti, C., Bernabei, R., & Hobson-Webb, L. D. (2023). Carpal tunnel syndrome: Updated evidence and new questions. *The Lancet Neurology*, 22(3), 255–267. [https://doi.org/10.1016/S1474-4422\(22\)00432-X](https://doi.org/10.1016/S1474-4422(22)00432-X)

- Phalen, G. S. (1966). The carpal-tunnel syndrome. Seventeen years' experience in diagnosis and treatment of six hundred fifty-four hands. *The Journal of Bone and Joint Surgery. American Volume*, 48(2), 211–228.
- Pisquiy, J. J., Chan, A. G., Prabhakar, G., Kusnezov, N., & Dunn, J. C. (2019). Incidence of Cubital Tunnel Syndrome in the U.S. Military Population. *The Journal of Hand Surgery*, 44(6), 516.e1–516.e7. <https://doi.org/10.1016/j.jhsa.2018.08.003>
- Radecki, P. (1994). The familial occurrence of carpal tunnel syndrome. *Muscle & Nerve*, 17(3), 325–330. <https://doi.org/10.1002/mus.880170311>
- Rajczewski, A., Daroszewski, P., Fabijański, A., Bogusławski, K., Kaźmierczak, M., & Huber, J. (2023). Incidence of Carpal Tunnel Syndrome and Other Coexisting Brachial Plexus Neuropathies in Bullseye Shooters—A Pilot Retrospective Clinical and Neurophysiological Assessment. *Applied Sciences*, 13(14), 8020. <https://doi.org/10.3390/app13148020>
- Raman, S. R., Al-Halabi, B., Hamdan, E., & Landry, M. D. (2012). Prevalence and risk factors associated with self-reported carpal tunnel syndrome (CTS) among office workers in Kuwait. *BMC Research Notes*, 5(1), 289. <https://doi.org/10.1186/1756-0500-5-289>
- Rempel, D. M., Keir, P. J., & Bach, J. M. (2008). Effect of wrist posture on carpal tunnel pressure while typing. *Journal of Orthopaedic Research*, 26(9), 1269–1273. <https://doi.org/10.1002/jor.20599>
- Rhon, D. I. I., Molloy, J. M., Monnier, A., Hando, B. R., & Newman, P. M. (2022). Much work remains to reach consensus on musculoskeletal injury risk in military service members: A systematic review with meta-analysis. *European Journal of Sport Science*, 22(1), 16–34. <https://doi.org/10.1080/17461391.2021.1931464>

- Rigouin, P., Ha, C., Bodin, J., Le Manac'h, A. P., Descatha, A., Goldberg, M., & Roquelaure, Y. (2014). Organizational and psychosocial risk factors for carpal tunnel syndrome: A cross-sectional study of French workers. *International Archives of Occupational and Environmental Health*, 87(2), 147–154.
<https://doi.org/10.1007/s00420-013-0846-0>
- Roquer, J., & Cano, J. F. (2009). Carpal tunnel syndrome and hyperthyroidism: A prospective study. *Acta Neurologica Scandinavica*, 88(2), 149–152.
<https://doi.org/10.1111/j.1600-0404.1993.tb04207.x>
- Rosenstock, L., & Cullen, M. R. (Eds.). (1994). *Textbook of clinical occupational and environmental medicine*. Saunders.
- Rosenstock, L. (2005). *Textbook of Clinical Occupational and Environmental Medicine*. Elsevier Saunders.
<https://books.google.ca/books?id=gRtnQgAACAAJ>
- Ruddy, S., Harris, E. D., Sledge, C. B., & Kelley, W. N. (2001). *Kelley's textbook of rheumatology* (6th ed). W.B. Saunders Co. Philadelphia; WorldCat.
- Rudzki, W., Delaney, T., & Macri, E. (2017). Military Personnel. In *Bruckner & Khan's Clinical Sports Medicine: Injuries* (5e ed., Vol. 1–1, pp. 991–1001). McGraw Hill.
<https://csm.mhmedical.com/content.aspx?bookid=1970§ionid=168697060>
- Saint-Lary, O., Rébois, A., Mediouni, Z., & Descatha, A. (2015). Carpal Tunnel Syndrome: Primary Care and Occupational Factors. *Frontiers in Medicine*, 2.
<https://doi.org/10.3389/fmed.2015.00028>
- Sammito, S., Hadzic, V., Karakolis, T., Kelly, K. R., Proctor, S. P., Stepens, A., White, G., & Zimmermann, W. O. (2021). Risk factors for musculoskeletal injuries in the military: A qualitative systematic review of the literature from the past two

- decades and a new prioritizing injury model. *Military Medical Research*, 8(1), 66. <https://doi.org/10.1186/s40779-021-00357-w>
- Samuel L. Turek, Stuart L. Weinstein, Buckwalter, J. A., & Turek, S. L. (1994). *Turek's Orthopaedics: Principles and Their Application*. Lippincott.
- Sauni, R., Pääkkönen, R., Virtema, P., Jäntti, V., Kähönen, M., Toppila, E., Pyykkö, I., & Uitti, J. (2009). Vibration-induced white finger syndrome and carpal tunnel syndrome among Finnish metal workers. *International Archives of Occupational and Environmental Health*, 82(4), 445–453. <https://doi.org/10.1007/s00420-008-0357-6>
- Schwarz, A., Keller, F., Seyfert, S., Pöll, W., Molzahn, M., & Distler, A. (1984). Carpal tunnel syndrome: A major complication in long-term hemodialysis patients. *Clinical Nephrology*, 22(3), 133–137.
- Shaffer, S. W., Koreerat, N. R., Gordon, L. B., Santillo, D. R., Moore, J. H., & Greathouse, D. G. (2013). Median and ulnar neuropathies in U.S. Army Medical Command Band members. *Medical Problems of Performing Artists*, 28(4), 188–194.
- Shiri, R., & Falah-Hassani, K. (2015). Computer use and carpal tunnel syndrome: A meta-analysis. *Journal of the Neurological Sciences*, 349(1–2), 15–19. <https://doi.org/10.1016/j.jns.2014.12.037>
- Sivri, A., Çeliker, R., Sungur, C., & Kutsal, Y. G. (1994). Carpal Tunnel Syndrome: A Major Complication in Hemodialysis Patients. *Scandinavian Journal of Rheumatology*, 23(5), 287–290. <https://doi.org/10.3109/03009749409103731>
- Sluiter, J. K., Rest, K. M., & Frings-Dresen, M. H. (2001). Criteria document for evaluating the work-relatedness of upper-extremity musculoskeletal

- disorders. *Scandinavian Journal of Work, Environment & Health*, 27, 1–102.
- JSTOR.
- Stjernbrandt, A., Vihlborg, P., Wahlström, V., Wahlström, J., & Lewis, C. (2022). Occupational cold exposure and symptoms of carpal tunnel syndrome – a population-based study. *BMC Musculoskeletal Disorders*, 23(1), 596. <https://doi.org/10.1186/s12891-022-05555-8>
- Stock, S. R. (1991). Workplace ergonomic factors and the development of musculoskeletal disorders of the neck and upper limbs: A meta-analysis. *American Journal of Industrial Medicine*, 19(1), 87–107. <https://doi.org/10.1002/ajim.4700190111>
- Strasberg, S. R., Novak, C. B., Mackinnon, S. E., & Murray, J. F. (1994). Subjective and employment outcome following secondary carpal tunnel surgery. *Annals of Plastic Surgery*, 32(5), 485–489. <https://doi.org/10.1097/00000637-199405000-00008>
- Tonga, F., & Bahadir, S. (2022). The Factors Associated with Carpal Tunnel Syndrome Severity. *Turkish Neurosurgery*, 32(3), 392–397. <https://doi.org/10.5137/1019-5149.JTN.34519-21.2>
- Toosi, K. K., Hogaboom, N. S., Oyster, M. L., & Boninger, M. L. (2015). Computer keyboarding biomechanics and acute changes in median nerve indicative of carpal tunnel syndrome. *Clinical Biomechanics*, 30(6), 546–550. <https://doi.org/10.1016/j.clinbiomech.2015.04.008>
- Tsai, C.-H., Hsu, H.-H., Chen, S.-H., Chien, L., Lin, J. A.-J., Chang, C.-J., & Kao, H.-K. (2020). Incidence and Risk of Carpal Tunnel Syndrome in End-Stage Renal Disease Patients on Dialysis: A Nationwide Population-Based Matched Cohort Study.

Annals of Plastic Surgery, 84(1S Suppl 1), S100–S106.

<https://doi.org/10.1097/SAP.0000000000002181>

Veterans Affairs Canada (2024). *Carpal Tunnel Syndrome*. License purchased for use from https://www.123rf.com/photo_180510408_carpal-tunnel-syndrome-compressed-median-nerve-anatomy-of-the-carpal-tunnel-showing-the-median.html

Wijnhoven, H. A. H., De Vet, H. C. W., & Picavet, H. S. J. (2006). Prevalence of musculoskeletal disorders is systematically higher in women than in men. *The Clinical Journal of Pain*, 22(8), 717–724.

<https://doi.org/10.1097/01.ajp.0000210912.95664.53>

Wolf, J. M., Mountcastle, S., & Owens, B. D. (2009). Incidence of carpal tunnel syndrome in the US military population. *Hand (New York, N.Y.)*, 4(3), 289–293.

<https://doi.org/10.1007/s11552-009-9166-y>

Woo, E. H. C., White, P., & Lai, C. W. K. (2019). Morphological Changes of the Median Nerve Within the Carpal Tunnel During Various Finger and Wrist Positions: An Analysis of Intensive and Nonintensive Electronic Device Users. *The Journal of Hand Surgery*, 44(7), 610.e1-610.e15. [5https://doi.org/10.1016/j.jhssa.2018.08.006](https://doi.org/10.1016/j.jhssa.2018.08.006)

World Health Organization. (2019). *International statistical classification of diseases and related health problems* (11th Revision). <https://icd.who.int/>