



Evidence Summary: Cumulative Trauma Conditions Medical Treatment Guideline 2017

This document contains a summary of the literature critique process and the resulting evidence statements for the Cumulative Trauma Conditions Medical Treatment Guideline.

See the *Search Strategy and Study Selection* documents (“General Medical Literature Search Strategy” and “Search Terms and Topics”) on the Division of Workers’ Compensation Website for more information on how studies were selected to be critiqued: <https://www.colorado.gov/pacific/cdle/medical-treatment-guidelines>. Critiques for individual articles are available on the Website under *Cumulative Trauma Conditions*. The literature critique criteria are also located on the Website under *Cumulative Trauma Conditions – Assessment Criteria for Critiques*.

Articles were critiqued using the Division’s literature critique criteria and given an assessment of “inadequate,” “adequate,” or “high quality.” It should be noted that one article may be graded at different levels for different interventions. Also, in multiple cases, literature from the Cochrane Collaboration was reviewed. When Division of Workers’ Compensation staff completed additional statistical pooling using RevMan (Cochrane Collaboration of Systematic Reviews), this is noted in the “Assessment by DOWC Staff” column of the critique.

For those studies deemed inadequate, a brief rationale was provided. The articles that were graded as either adequate or high quality were used for evidence statements. Three levels (“**some evidence**,” “**good evidence**,” and “**strong evidence**”) were then used to describe strength of evidence for recommendations based on the amount and quality of the supporting literature. These levels of evidence are defined in the General Guidelines Principles, which are located in each of the Division Medical Treatment Guidelines.

- “Some” means the recommendation considered at least one adequate scientific study, which reported that a treatment was effective. The Division recognizes that further research is likely to have an impact on the intervention’s effect.
- “Good” means the recommendation considered the availability of multiple adequate scientific studies or at least one relevant high-quality scientific study, which reported that a treatment was effective. The Division recognizes that further research may have an impact on the intervention’s effect.
- “Strong” means the recommendation considered the availability of multiple relevant and high-quality scientific studies, which arrived at similar conclusions about the effectiveness of a treatment. The Division recognizes that further research is unlikely to have an important impact on the intervention’s effect.



Because the Division synthesizes the medical evidence as much as possible, one assessment (or group of assessments) may potentially create more than one evidence statement. It is also possible that multiple assessments may be combined for a higher level of evidence (e.g., two “adequate” studies might strengthen the evidence supporting a recommendation from “some” to “good”).

Note that other recommendations in the Medical Treatment Guideline are consensus statements. Consensus statements are used only when adequate evidence was not available in the published literature reviewed by the Division or when published evidence was conflicting. The multidisciplinary Task Force makes consensus recommendations based on general medical principles and apply the following values: functional benefit to the patient, acceptable risk and morbidity, length of disability and timeframe to recovery, and lastly, acceptable cost. Consensus statements are often designated in Medical Treatment Guideline as “generally well accepted,” “generally accepted,” “acceptable/accepted,” or “well-established.”

The Medical Treatment Guideline for Cumulative Trauma Conditions has a bibliography comprised of 599 articles, and 110 of those were used in evidence statements. The following evidence table is a *summary* of evidence based on critique of scholarly articles. See full critiques, available on the Division’s Website, for more details on specific studies and assessment of them.

Evidence Statement	Citation	Design
There is some evidence that patients with upper extremity disorders are less likely to control their diabetes. Therefore, it is appropriate to order a hemoglobin A1c to screen any diabetic patients with a cumulative trauma conditions or for initial screening.	(Ramchurn et al., 2009)	Cross-sectional study
There is good evidence that keyboarding in a reasonable ergonomic posture (wrist with 30 degrees or less of extension and 15 degrees or less of radial deviation) up to 7 hours per day under usual conditions is very unlikely to cause carpal tunnel syndrome or other upper extremity disorders. This conclusion is based on studies of carpal tunnel pressure under a variety of typing and wrist positions as well as a number of studies of workers who keyboard on a regular basis.	(Andersen et al., 2003)	Prospective cohort study



Evidence Statement	Citation	Design
	(Atroshi, Gummesson, Ornstein, Johnsson, & Ranstam, 2007)	Cross-sectional study
	(Jensen, 2003)	Prospective cohort study
	(Lassen et al., 2004)	Prospective cohort study
	(Palmer, Harris, & Coggon, 2007)	Systematic review of observational studies
	(Roquelaure et al., 2009)	Cross-sectional study
	(Shiri, Viikari-Juntura, Varonen, & Heliövaara, 2006) (Thomsen, Gerr, & Atroshi, 2008)	Cross-sectional health survey Systematic review of observational studies
There is some evidence that mouse use appears to be associated with carpal tunnel syndrome and related symptoms with 4 hours or greater of continuous use per day.	(Andersen et al., 2003)	Prospective cohort study
	(Stevens, Witt, Smith, & Weaver, 2001)	Cross sectional survey
There is some evidence that a Functional Capacity Evaluation (FCE) fails to predict which injured workers with chronic low back pain will have sustained return to work.	(Gross & Battie, 2004)	Observational prognostic study
There is some evidence that time off work and gender are important predictors for return to work, and floor-to-waist lifting may also help predict return to work. However, the strength of that relationship has not been determined.	(Matheson, Isernhagen, & Hart, 2002)	Retrospective Study



Evidence Statement	Citation	Design
There is some evidence in chronic low back pain patients that (1) FCE task performance is weakly related to time on disability and time for claim closure, and (2) even claimants who fail on numerous physical performance FCE tasks may be able to return to work.	(Gross, Battie, & Cassidy, 2004)	Observational prognostic study
There is some evidence that a short form FCE reduced to a few tests produces a similar predictive quality compared to the longer 2-day version of the FCE regarding length of disability and recurrence of a claim after return to work.	(Gross, Battie, & Asante, 2007)	Randomized clinical trial
Aggravated thumb osteoarthritis: There is good evidence that custom splints used nocturnally for 1 year decrease pain and increase function.	(Rannou et al., 2009)	Randomized clinical trial
There is some evidence that home-based hand exercises with phone call follow-up and monitoring plus hand osteoarthritis (HOA) information is more effective than only giving HOA information in improving hand functionality in women with HOA.	(Hennig et al., 2015)	Randomized controlled trial
There is good evidence that diclofenac gel reduces pain and improves function in mild-to-moderate hand osteoarthritis.	(Altman et al., 2009)	Randomized clinical trial
There is some evidence that topical ketoprofen patches are more effective than placebo in reducing pain of upper extremity tendonitis; however, the need for continuous skin application may limit overall use.	(Mazieres, Rouanet, Guillon, Scarsi, & Reiner, 2005)	Randomized clinical trial
There is some evidence that intra-articular hyaluronan is not superior to placebo for improving pain in the setting of carpometacarpal osteoarthritis.	(Mandl et al., 2012)	Phase 3 randomized clinical trial



Evidence Statement	Citation	Design
Carpometacarpal osteoarthritis: There is some evidence that intra-articular hyaluronan does not improve function in a clinically important way in the first six months after injection.	(Mandl et al., 2012)	Phase 3 randomized clinical trial
There is good evidence that trapeziectomy alone and trapeziectomy plus ligament reconstruction and tendon interposition have similar outcomes at 1 year.	(Belcher & Nicholl, 2000).	Randomized clinical trial
	(Davis, Brady, & Dias, 2004)	Randomized clinical trial
There is some evidence that in the post-operative management at one year following trapeziometacarpal (TMC) arthroplasty, there is no significant difference in pain, function, range of motion, or grip strength between patients who wore standard rigid orthoses and patients who wore semi-rigid orthoses from 2 to 6 weeks following TMC arthroplasty.	(Prosser et al., 2014)	Randomized controlled trial
There is some evidence that in the setting of de Quervain's disease, functional benefits of a corticosteroid injection are enhanced by a thumb spica cast which reduces stress on the abductor pollicis longus and extensor pollicis brevis tendons.	(Mardani-Kivi et al., 2014)	Randomized clinical trial
There is some evidence that endoscopic and open release result in equally satisfactory 24 week outcomes and approximately equal return to work times for de Quervain's tenosynovitis. However, with endoscopic release there is a lower risk of transient injury to the superficial radial nerve, better scar satisfaction, and a slightly more rapid resolution of pain and functional limitations.	(Kang, Koh, Jang, & Choi, 2013)	Randomized clinical trial
There is strong evidence that in the setting of lateral epicondylitis, the effects of corticosteroid injections on pain and function are more favorable than placebo in the first four	(Arik et al., 2014)	Randomized clinical trial



Evidence Statement	Citation	Design
<p>weeks, but these benefits are reversed by six months and are detrimental compared to placebo injections in the intermediate and long term.</p>		
	(Coombes, Bisset, & Vicenzino, 2010)	Meta-analysis of randomized clinical trials
	(Kucuksen, Yilmaz, Salli, & Ugurlu, 2013)	Randomized clinical trial
	(Mardani-Kivi et al., 2013)	Randomized clinical trial
	(Peerbooms, Sluimer, Bruijn, & Gosens, 2010)	Randomized clinical trial
<p>There is good evidence that botulinum toxin A injection may provide short-term pain relief from pain due to chronic (3 months or longer) lateral epicondylitis.</p>	(Espandar et al., 2010)	Randomized clinical trial
	(Placzek, Drescher, Deuretzbacher, Hempfing, & Meiss, 2007)	Randomized clinical trial
	(Wong et al., 2005)	Randomized clinical trial
<p>There is good evidence that botulinum toxin A injections cause weakness in finger extension and/or digit paresis. Additional complications may include: allergic reaction to medications, increased risk of systemic effects in patients with motor neuropathy or disorders of the neuromuscular junction.</p>	(Espandar et al., 2010)	Randomized clinical trial
	(Placzek et al., 2007)	Randomized clinical trial



Evidence Statement	Citation	Design
	(Wong et al., 2005)	Randomized clinical trial
There is some evidence in literature on lateral epicondylitis that, for patients with symptoms lasting 6 months or more, autologous blood injections result in better pain and functional outcomes after 1 year than steroid injections.	(Ozturan, Yucel, Cakici, Guven, & Sungur, 2010)	Randomized clinical trial
There is good evidence in literature on lateral epicondylitis that, for patients with symptoms lasting 6 months or more, platelet-rich plasma injections result in better pain and functional outcomes after 1 year than steroid injections.	(Peerbooms et al., 2010)	Randomized clinical trial
There is good evidence that in the setting of lateral epicondylitis, platelet-rich plasma injections may lead to a small to moderate functional benefit in comparison to autologous whole blood or saline at two to three months, but effects on pain are uncertain.	([Cochrane] Moraes, Lenza, Tamaoki, Faloppa, & Belloti, 2013)	Meta-analysis of randomized clinical trials
There is good evidence that platelet-rich plasma injections produces more favorable symptomatic and functional improvement than triamcinolone injection in patients with chronic lateral epicondylitis, with this advantage persisting for 24 months after treatment.	(Gosens, Peerbooms, van Laar, & den Oudsten, 2011)	Follow-up of a previously published randomized clinical trial
There is good evidence that low level laser is not more effective than placebo for lateral epicondylitis.	(Bisset, Paungmali, Vicenzino, & Beller, 2005)	Meta-analysis/systematic review of clinical trials
There is some evidence that highly motivated tennis players may show up to a 35% additional improvement over no other treatment when administered low energy shock wave treatment without local anesthesia.	(Rompe, 2004)	Randomized clinical trial
There is some evidence that three weekly sessions of radial	(Capan et al., 2016)	Randomized clinical trial



Evidence Statement	Citation	Design
extracorporeal shock wave therapy (ESWT) and sham ESWT lead to statistically similar symptomatic and functional outcomes at three months. However, a benefit of radial ESWT cannot be ruled out due to uncertainties in the data.		
There is some evidence that acupuncture has a very short term 2 week effect on pain compared to sham acupuncture for lateral epicondylitis.	(Fink et al., 2002)	Randomized clinical trial
There is some evidence from a small study that wearing a topical patch containing glyceryl trinitrate over an area of tendinopathy is more effective than a placebo patch in reducing pain and improving overall clinical recovery in subjects with lateral epicondylitis over a period of 6 months. Improvement in function was not clearly demonstrated.	(Ozden, Uruc, Dogramaci, Kalaci, & Yengil, 2014)	Randomized controlled trial
There is some evidence that topical glyceryl trinitrate is not effective for lateral epicondylitis from a study demonstrating no benefit compared to placebo with varied doses.	(Paoloni, Murrell, Burch, & Ang, 2009)	Randomized clinical trial
Epicondylitis: There is good evidence that there are early benefits from an 8 week program of weekly, individualized physical therapy for patients who do not receive a corticosteroid injection. However, the natural history of the condition tends to obscure these early benefits at one year from the time therapy begins.	(Coombes, Bisset, Brooks, Khan, & Vicenzino, 2013)	Randomized clinical trial
There is some evidence that for subjects with long-term lateral epicondylalgia, a daily 6-week eccentric home exercise regimen is effective in increasing pain-free hand-grip, increasing wrist-extensor strength, and reducing the number of cases that meet the diagnostic criteria for lateral epicondylalgia.	(Soderberg, Grooten, & Ang, 2012)	Randomized single-blinded controlled trial



Evidence Statement	Citation	Design
There is some evidence that the addition of Mulligan mobilization to a regimen comprising of ultrasound therapy and progressive exercises is more effective in decreasing pain and increasing pain-free grip strength than ultrasound therapy and progressive exercises alone in the treatment of lateral epicondylitis.	(Kochar & Dogra, 2002)	Controlled trial (partially randomized)
There is some evidence that both Cyriax physiotherapy (deep transverse friction massage combined with Mills manipulation) and phonophoresis with supervised exercise and static stretching are effective over a period of 4 weeks of treatment for lateral epicondylalgia in decreasing pain, increasing pain-free grip strength, and improving functional status. However, Cyriax physiotherapy provides a superior benefit compared to phonophoresis with supervised exercise and static stretching.	(Nagrle, Herd, Ganvir, & Ramteke, 2009)	Randomized controlled trial
The muscle energy technique is a manual therapy technique in which the patient performs voluntary contraction against a counter force from the provider to stretch muscles and improve range of motion. There is some evidence that the muscle energy technique is superior to corticosteroid injection in improving grip strength in lateral epicondylitis. However, it is not clear that the technique is better than no treatment.	(Kucuksen et al., 2013)	Randomized clinical trial
There is good evidence that manual and manipulative therapy combined with exercise and/or multimodal therapy shows small, clinically important reductions in pain and improved physical function in the short-term care (\leq 3-6 months) of patients with lateral epicondylitis and carpal tunnel syndrome.	(Brantingham et al., 2013)	Systematic review of randomized clinical trials
Epicondylitis: There is good evidence that physical therapy using manipulation, home exercise and supervised exercise	(Bisset et al., 2006)	Randomized clinical trial



Evidence Statement	Citation	Design
reduced pain at 6 weeks but not at 52 weeks.		
There is good evidence that no specific surgical intervention is effective for lateral elbow pain.	([Cochrane] Buchbinder et al., 2011)	Systematic review of clinical trials
There is good evidence that MRI arthrography (MRA) is a more sensitive and more specific diagnostic test for triangular fibrocartilaginous complex injury (TFCC) than MRI. There is also good evidence that many patients who do not have TFCC can be more accurately identified with MRA rather than MRI.	(Smith, Drew, Toms, Jerosch-Herold, & Chojnowski, 2012)	Meta-analysis of studies of the accuracy of diagnostic tests
There is some evidence that in the intermediate term (up to three months), injections with triamcinolone and with diclofenac are equally effective in patients with trigger digit.	(Shakeel & Ahmad, 2012)	Randomized clinical trial
There is good evidence that open and percutaneous trigger digit release have similar success rates and similar complication rates.	(Wang, Zhao, & Liang, 2013)	Meta-analysis of clinical trials
Trigger Digit: There is good evidence that percutaneous release has a lower rate of recurrence than does a steroid injection.	(Wang et al., 2013)	Meta-analysis of clinical trials
There is some evidence that in patients with suspected carpal tunnel syndrome, a modified Phalen's test can, in comparison with the traditional Phalen's test, increase the sensitivity of the physical examination without sacrificing specificity. The test involves placing the hands of the patient in the usual flexed position for the traditional Phalen's test and applying a 2.83 unit Semmes-Weinstein monofilament perpendicular to the palmar aspect and to the lateral side of the distal phalanx of the digits innervated by the median nerve. Report as positive any test result in which the patient is unable to detect the	(Bilkis et al., 2012)	Study of the accuracy of a diagnostic test



Evidence Statement	Citation	Design
application of the filament. The distal phalanx of the fifth digit should be used as a control.		
Carpal Tunnel Syndrome: There is good evidence that NSAIDs and diuretics add no benefits for symptom improvement compared to placebo at 4 weeks.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that Vitamin B6 adds no benefit on symptom improvement compared to placebo at 10-12 weeks.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is good evidence that oral steroids are more effective than placebo in improving symptoms in the short term.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that oral steroids are not effective in improving symptoms in the long term (12 months).	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that 6 weeks of oral steroids are more effective than splinting in improving function but not symptoms in the short term.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence in the short term (4 weeks) and absence of evidence in the midterm (4-6 months) that a nocturnal hand brace is more effective for reducing pain and improving function compared to no treatment.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence in the short term that a 3-month night treatment with either the soft hand brace or the wrist splint is effective in reducing symptoms and improving function, but there is no significant difference	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials



Evidence Statement	Citation	Design
between the 2 interventions.		
Carpal Tunnel Syndrome: There is good evidence that steroid injections have better results at 3 months than oral steroids.	(Wong et al., 2001)	Randomized clinical trial
There is good evidence that a steroid injection produces a significant decrease in carpal tunnel symptoms for up to 10 weeks, with outcomes comparable to surgery.	(Atroshi, Flondell, Hofer, & Ranstam, 2013)	Randomized clinical trial
Carpal Tunnel Syndrome: There is some evidence of significant improvement in symptom scores at 6 weeks in both injection and surgery. However, by 20 weeks, there was a diminishing of the response to injection while the surgery group had a persistent improvement in symptoms. It should be noted that while the symptoms worsened over time in the injection group, there was still an increase in grip strength at 4 months of 2.4kg whereas the surgery group had a decrease of 1.7kg	(Hui et al., 2005)	Randomized clinical trial
Carpal Tunnel Syndrome: There is good evidence showing that improvement in symptoms after steroid injection begins to decrease over time and by 1 year, 73-81% of those patients receiving steroids require surgical intervention due to relapsing symptoms.	(Atroshi et al., 2013)	Randomized clinical trial
There is some evidence that only 51% percent of patients with mild to moderate carpal tunnel symptoms responded to steroid injections with a significant response, and of those that responded, 49% required additional injections and/or surgery by 1 year.	(Peters-Veluthamaningal, Winters, Groenier, & Meyboom-de Jong, 2010)	Randomized clinical trial
There is good evidence that in patients with carpal tunnel syndrome who have not improved after 2 months of splinting,	(Atroshi et al., 2013)	Randomized clinical trial



Evidence Statement	Citation	Design
an injection of 80 mg of methylprednisolone and of 40 mg of methylprednisolone are equally likely to lead to short-term 5-week improvements in carpal tunnel symptoms compared to placebo. However, the success of methylprednisolone in avoiding surgery in carpal tunnel syndrome patients is modest. Although approximately 92% of placebo-injected patients are likely to require carpal tunnel release within one year, about three quarters of patients who have a methylprednisolone injection are also likely to have surgery. However, this modest difference in rates of surgery may prevent a large number of carpal tunnel release operations if steroid injections are offered to a large population of carpal tunnel syndrome patients who continue to have symptoms after a 2 month trial of splinting.		
Carpal Tunnel Syndrome: There is some evidence that 60mg methylprednisone injection is more effective than 20 or 40mg methylprednisone at 6 months but not at one year.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that there is no significant difference between a single corticosteroid injection of 15mg methylprednisolone compared with 2 local corticosteroid injections regarding symptom improvement at 8, 24, and 40 weeks after injection.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is good evidence that neuro-dynamic technique plus splinting add no benefit to reduce pain or improve function compared to splinting alone after 3 weeks.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
There is some evidence that an initial treatment approach for carpal tunnel syndrome involving physical manual therapy directed at the entire course of the median nerve from the scalene muscles to the wrist, in combination with nerve and tendon gliding exercises, is as successful as carpal tunnel	(Fernandez-de-Las Penas et al., 2015)	Randomized clinical trial



Evidence Statement	Citation	Design
release at 6 months and at 1 year. The physical manual therapy combined with nerve and tendon gliding exercises may show advantages over surgery at 1 and 3 months. However, there was incomplete analysis of patient data.		
Carpal Tunnel Syndrome: There is good evidence that soft tissue mobilization plus home exercises is effective in reducing pain and improving function at 6 months.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that ultrasound is no more effective than placebo at 2 weeks of follow-up regarding pain, symptoms, and function. However, there is some evidence that ultrasound is more effective in improving symptoms only, not function, compared to placebo at 7 weeks of follow-up and in the midterm (4-6 months).	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that there is no significant difference between an ultrasound intensity of 1.5W/cm ² compared with 0.8W/cm ² regarding pain and symptom improvement after 2 weeks.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that ultrasound is more effective on pain and function than low level laser therapy at 4 weeks; however, low level laser is ineffective.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
There is some evidence that there is no beneficial effectiveness of pulsed or continuous ultrasound combined with splint therapy compared to sham ultrasound and splint therapy in reducing pain and symptoms and improving functionality for treating patients with mild or moderate idiopathic carpal tunnel syndrome. This study is inconclusive in its ability to find an effect due to only 70% power and a small sample size.	(Armagan, Bakilan, Ozgen, Mehmetoglu, & Oner, 2014)	Randomized controlled trial



Evidence Statement	Citation	Design
There is some evidence that ultrasound therapy plus splinting is no more effective than placebo ultrasound plus splinting in reducing pain and symptoms and improving functionality in the conservative treatment of patients with carpal tunnel syndrome.	(Yildiz et al., 2011)	Randomized, prospective, controlled, double-blinded clinical trial
There is some evidence that low level laser therapy adds no short term benefit for reducing symptoms and improving function compared to full-time splinting for 3 months.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
There is good evidence that laser therapy is ineffective regarding pain and function compared with placebo as an intervention to treat carpal tunnel syndrome in the short term.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
This is some evidence that Low Level Laser Therapy (LLLT) is no more effective than placebo LLLT in reducing pain and symptoms and improving functionality in the conservative treatment of patients affected by carpal tunnel syndrome.	(Tascioglu, Degirmenci, Ozkan, & Mehmetoglu, 2012)	Randomized, prospective, placebo-controlled, double-blinded trial
There is some evidence that Low Level Laser Therapy plus splinting is no more effective than splinting alone in reducing carpal tunnel symptoms and improving functionality in the conservative treatment of patients affected by carpal tunnel syndrome.	(Yagci et al., 2009)	Randomized, prospective, controlled, partially blinded trial
Carpal Tunnel Syndrome: There is some evidence that yoga is equally as effective in reducing pain and improving grip strength as wrist splinting in the short term.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
Carpal Tunnel Syndrome: There is some evidence that Hatha yoga instruction may reduce pain and improve grip strength as effectively as splinting. However, the evidence was inadequate	(Garfinkel et al., 1998)	Randomized clinical trial



Evidence Statement	Citation	Design
to show superiority over splinting.		
Carpal Tunnel Syndrome: There is some evidence that laser acupuncture adds no benefits to night pain improvement compared to placebo at 3 weeks.	(Huisstede et al., 2010)	Systematic review and meta-analysis of systematic reviews and randomized clinical trials
There is some evidence that there are no differences between needle acupuncture combined with a wrist brace and placebo needle acupuncture combined with a wrist brace. Neither treatment is clinically effective in improving function in patients with mild or moderate carpal tunnel syndrome.	(Yao et al., 2012)	Prospective, randomized, placebo-controlled, double-blinded trial
There is strong evidence that in patients with carpal tunnel syndrome which has not become chronic, carpal tunnel release leads to a moderate treatment advantage with respect to functional improvement 6 months after surgery. However, there is considerable benefit to conservative treatment such as worksite ergonomic changes, splinting, and individualized hand therapy, which are appropriate for first-line treatment. There is insufficient evidence to identify which patients are likely not to benefit from conservative treatment sufficiently to avoid surgery.	(Shi, MacDermid, Santaguida, & Kyu, 2011)	Meta-analysis of randomized clinical trials
For patients with clinically typical carpal tunnel symptoms of median nerve distribution numbness, with or without pain, which awakens the patient at night and is alleviated by shaking the hand: there is some evidence that the symptom and function outcomes of mini-open carpal tunnel release are similar at 6 months for patients who do and do not undergo preoperative nerve conduction studies. However, the study excluded patients with atypical symptoms or unusual courses of disease, recurrent syndrome, diabetic neuropathy, and cervical radiculopathy.	(Zyluk & Szlosser, 2013)	Randomized clinical trial



Evidence Statement	Citation	Design
There is strong evidence that surgery is more effective than splinting or injections in producing long-term symptom relief and normalization of median nerve conduction velocity for those patients with clinically significant carpal tunnel syndrome with positive nerve conduction velocity findings.	(Gerritsen et al., 2002)	Randomized clinical trial
	(Hui et al., 2005)	Randomized clinical trial
	(Jarvik et al., 2009)	Randomized clinical trial
Carpal Tunnel Syndrome: There is good evidence that surgery improves symptoms more effectively than steroid injection for up to five months.	(Hui et al., 2005)	Randomized clinical trial
Carpal Tunnel Syndrome: There is good evidence that surgery is more beneficial than non-surgical treatment for patients with a motor latency of more than 4.5 ms.	(Hui et al., 2005)	Randomized clinical trial
	(Jarvik et al., 2009)	Randomized clinical trial
There is some evidence that, in patients with carpal tunnel syndrome requiring surgery, endoscopic carpal tunnel release (ECTR) leads to earlier recovery of grip strength and earlier return to work than open carpal tunnel release (OCTR).	([Cochrane] Vasiliadis, Georgoulas, Shrier, Salanti, & Scholten, 2014)	Meta-analysis of clinical trials



Evidence Statement	Citation	Design
Carpal Tunnel Syndrome: There is good evidence that ECTR and OCTR are nearly equivalent with respect to short-term and long-term pain, numbness, and patient-reported general hand function.	([Cochrane] Vasiliadis et al., 2014)	Meta-analysis of clinical trials
There is some evidence that, in patients undergoing endoscopic carpal tunnel release, local anesthesia controls intraoperative pain as effectively as intravenous regional anesthesia, and local anesthesia may be simpler and less invasive to perform, with shorter tourniquet inflation and operating room times than intravenous regional anesthesia.	(Nabhan, Steudel, Dedeman, Al-Khayat, & Ishak, 2011)	Randomized clinical trial
Carpal Tunnel Syndrome: There is some evidence that immediate mobilization of the wrist following surgery is associated with less scar pain and faster return to work.	(Cook, Szabo, Birkholz, & King, 1995)	Randomized clinical trial
There is some evidence that removal of a bulky dressing after mini-open Carpal Tunnel Release and replacement with an adhesive strip at 48 to 72 hours causes no wound complications and results in equal short-term (2-week) clinical and subjective outcome measures compared with using a bulky dressing for 2 weeks.	(Ritting et al., 2012)	Randomized controlled trial
There is good evidence that routine use of hand therapy after surgery does not improve pain, function, or return to work in carpal tunnel syndrome uncomplicated by endocrine disease, arthritis, or advanced median nerve disease.	(Pomerance & Fine, 2007)	Randomized clinical trial



Evidence Statement	Citation	Design
There is some evidence that a trial of conservative treatment for cubital tunnel syndrome is as effective as a treatment program involving nocturnal bracing and a program involving gliding exercises. However, this conservative treatment should educate the patient on nerve anatomy, causes of symptoms, and appropriate elbow movements. Recurrence is common, so patient education regarding provocative activities is essential for long term recovery.	(Svernlöv, Larsson, Rehn, & Adolfsson, 2009) .	Randomized clinical trial
Cubital Tunnel Syndrome: There is good evidence that simple decompression and anterior transposition lead to equally good functional outcomes.	([Cochrane] Caliendo, La Torre, Padua, Giannini, & Padua, 2012)	Meta-analysis of clinical trials
Cubital Tunnel Syndrome: There is good evidence that the complication rate in terms of post-operative infection is considerably higher with anterior transposition than with simple decompression, for which the infection rate is approximately two thirds lower.	([Cochrane] Caliendo et al., 2012)	Meta-analysis of clinical trials
There is good evidence that true acupuncture at traditional meridians is marginally better than sham acupuncture with blunt needles in reducing pain, but effects on disability are unclear.	(Cho et al., 2013)	Randomized clinical trial
There is good evidence that biofeedback or relaxation therapy is equal in effect to cognitive behavioral therapy for chronic low back pain.	(Hoffman, Papas, Chatkoff, & Kerns, 2007)	Meta-analysis of controlled clinical trials
There is some evidence that information provided only by video is not sufficient education.	(Newcomer, Vickers Douglas, Shelerud, Long, & Crawford, 2008)	Prospective RCT



Evidence Statement	Citation	Design
There is some evidence that an intra-articular injection of 80 mg of methylprednisolone acetate into the knee has about a 25% probability of suppressing the adrenal gland response to exogenous adrenocorticotrophic hormone ACTH for four or more weeks after injection, but complete recovery of the adrenal response is seen by week 8 after injection.	(Habib, Jabbour, Artul, & Hakim, 2014)	Randomized clinical trial
There is good evidence that interdisciplinary programs that include screening for psychological issues, identification of fear-avoidance beliefs and treatment barriers, and establishment of individual functional and work goals will improve function and decrease disability.	(Dobscha et al., 2009)	Cluster randomized trial
	(Lambeek, van Mechelen, Knol, Loisel, & Anema, 2010)	Randomized clinical trial
There is good evidence that exercise, alone or as part of a multi-disciplinary program, results in decreased disability for workers with non-acute low back pain.	(Oesch, Kool, Hagen, & Bachmann, 2010)	Meta-analysis of randomized clinical trials
There is some evidence that an integrated care program, consisting of workplace interventions and graded activity teaching that pain need not limit activity, is effective in returning patients with chronic low back pain to work, even with minimal reported reduction of pain.	(Lambeek et al., 2010)	Randomized clinical trial
There is good evidence that acetaminophen is not more effective than placebo for the treatment of knee osteoarthritis.	(Bannuru et al., 2015)	Network meta-analysis of randomized clinical trials
Topical NSAIDs may be more appropriate for some patients as there is some evidence they are associated with fewer systemic adverse events than oral NSAIDs.	([Cochrane] Massey, Derry, Moore, & McQuay, 2010)	Meta-analysis of randomized clinical trials



Evidence Statement	Citation	Design
There is some evidence that among adults motivated to quit smoking, 12 weeks of open-label treatment including counseling and one of the following: nicotine patch, varenicline, or combination nicotine replacement therapy (nicotine patch and nicotine lozenge) are equally effective in assisting motivated smokers to quit smoking over a period of one year	(Baker et al., 2016)	Randomized clinical trial
There is some evidence that among adults motivated to quit smoking, abrupt smoking cessation is more effective than gradual cessation for abstinence lasting over a period of 4 weeks to 6 months, even for smokers who initially prefer to quit by gradual reduction	(Lindson-Hawley et al., 2016)	Randomized controlled non-inferiority trial
There is good evidence that cognitive intervention reduces low back disability in the short-term and in the long-term. In one of the studies, the therapy consisted of 6, 2-hour sessions given weekly to workers who had been sick-listed for 8-12 weeks. Comparison groups include those who received routine care.	(Linton, Boersma, Jansson, Svard, & Botvalde, 2005)	Randomized clinical trial
	(Storheim, Brox, Holm, Koller, & Bo, 2003)	Randomized clinical trial
There is good evidence that psychological interventions, especially Cognitive Behavioral Therapy (CBT), are superior to no psychological intervention for chronic low back pain.	(Hoffman et al., 2007)	Meta-analysis of controlled clinical trials
There is good evidence that six group therapy sessions lasting one and a half hours each focused on CBT skills improved function and alleviated pain in uncomplicated sub-acute and chronic low back pain patients.	(Lamb et al., 2010)	Group randomized clinical trial



Evidence Statement	Citation	Design
There is some evidence that CBT provided in 7, 2-hour small group sessions can reduce the severity of insomnia in chronic pain patients	(Currie, Wilson, Pontefract, & deLaplante, 2000)	Randomized clinical trial
A Cochrane meta-analysis grouped very heterogeneous behavioral interventions and concluded that there was good evidence that CBT may reduce pain and disability, but the effect size was uncertain.	([Cochrane] Eccleston, Williams, & Morley, 2009)	Meta-analysis of randomized clinical trials

Evidence Statement Regarding Diagnosis-Based Risk Factors	Citation	Design
There is good evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome: Combination of force, repetition, and vibration.	(Shiri, Miranda, Heliövaara, & Viikari-Juntura, 2009)	Cross-sectional study
There is good evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome: Combination of repetition and force for 6 hours.	(Silverstein, Fine, & Armstrong, 1987)	Cross-sectional study
There is good evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome: Combination repetition and forceful tool use with awkward posture for 6 hours.	(Frost, Andersen, & Nielsen, 1998)	Retrospective cohort study
There is good evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome: Combination force, repetition, and awkward posture.	(Mattioli et al., 2009)	Case-control study



Evidence Statement Regarding Diagnosis-Based Risk Factors	Citation	Design
<p>There is good evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome:</p> <p>Combination of 2 pound pinch or 10 pound hand force 3 times or more per minute for 3 hours.</p>	(Harris-Adamson et al., 2015)	Multicenter prospective cohort study
<p>There is some evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome:</p> <p>Wrist bending or awkward posture for 4 hrs.</p>	(Nordstrom, Vierkant, DeStefano, & Layde, 1997)	Population-based case-control study
<p>There is some evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome:</p> <p>Mouse use more than 4 hours.</p>	(Andersen et al., 2003)	Prospective cohort study
<p>There is some evidence for the following diagnosis-based risk factors for Carpal Tunnel Syndrome:</p> <p>Combination cold and forceful repetition for 6 hours - Frozen food handling.</p>	(Chiang, Chen, Yu, & Ko, 1990)	Cohort study
<p>There is good evidence against diagnosis-based risk factors for Carpal Tunnel Syndrome:</p> <p>Keyboarding less than or equal to 7 hrs. in good ergonomic position IS NOT RELATED.</p>	(Ali & Sathiyasekaran, 2006)	Cross-sectional study
	(Andersen et al., 2003)	Prospective cohort study
	(Atroshi et al., 2007)	Cross-sectional study
	(Mediouni et al., 2015)	Two cohort studies in France and in the United States



Evidence Statement Regarding Diagnosis-Based Risk Factors	Citation	Design
	(Roquelaure et al., 2009)	Cross-sectional study
<p>There is good evidence against diagnosis-based risk factors for Carpal Tunnel Syndrome:</p> <p>Repetition alone less than or equal to 6 hrs. IS NOT RELATED.</p>	(Leclerc et al., 2001)	Observational cohort study
	(Shiri et al., 2009)	Cross-sectional study
<p>There is some evidence for the following diagnosis-based risk factors for Cubital Tunnel Syndrome:</p> <p>Combination forceful tool use, repetition and probably posture for 6 hrs - Holding a tool in position with repetition.</p>	(Descatha, Leclerc, Chastang, Roquelaure, & Study Group on Repetitive Work, 2004)	Observational cohort study
<p>There is good evidence for the following diagnosis-based risk factors for DeQuervain's Disease:</p> <p>Combination force, repetition, & posture.</p>	(National Institute of Occupational Safety and Health [NIOSH], 1997)	Review
<p>There is good evidence for the following diagnosis-based risk factors for Epicondylitis Lateral:</p> <p>Combination – awkward posture (forearm supination past 45 degrees) and forceful lifting.</p>	(Fan et al., 2009)	Cross-sectional workplace survey
<p>There is good evidence for the following diagnosis-based risk factors for Epicondylitis Lateral:</p> <p>Combination force and possible awkward posture – study used repetition and turning and screwing.</p>	(Leclerc et al., 2001)	Observational cohort study
<p>There is good evidence for the following diagnosis-based risk factors for Epicondylitis Lateral:</p>	(Fan et al., 2014)	Cohort study



Evidence Statement Regarding Diagnosis-Based Risk Factors	Citation	Design
Combination forearm pronation 45° or greater with power grip or lifting for 3 hours per day.		
There is some evidence for the following diagnosis-based risk factors for Epicondylitis Lateral: Combination of wrist bending for 4 hours and rotation the forearm for 2 hours.	(Descatha, Dale, Jaegers, Herquelot, & Evanoff, 2013)	Industry-based cohort study
There is some evidence for the following diagnosis-based risk factors for Epicondylitis Lateral: Combination repetition and awkward posture including static posture.	(Ono et al., 1998)	Cross-sectional study
There is some evidence against diagnosis-based risk factors for Epicondylitis Lateral: Keyboard use IS NOT RELATED.	(Shiri et al., 2006)	Cross-sectional health survey
There is good evidence for the following diagnosis-based risk factors for Epicondylitis Medial: Combination – force & repetition.	(National Institute of Occupational Safety and Health [NIOSH], 1997)	Review
There is good evidence for the following diagnosis-based risk factors for Epicondylitis Medial: Combination – force and wrist and hand repetition.	(Shiri et al., 2006)	Cross-sectional health survey
There is some evidence for the following diagnosis-based risk factors for Epicondylitis Medial: Combination of wrist bending for 4 hours and rotation the forearm for 2 hours.	(Descatha et al., 2013)	Industry-based cohort study



Evidence Statement Regarding Diagnosis-Based Risk Factors	Citation	Design
There is some evidence against diagnosis-based risk factors for Epicondylitis Medial: Some evidence keyboard use IS NOT RELATED.	(Shiri et al., 2006)	Cross-sectional health survey
There is good evidence for the following diagnosis-based risk factors for Extensor tendon disorders of the Wrist: Combination - force & repetition.	(National Institute of Occupational Safety and Health [NIOSH], 1997)	Review
There is good evidence for the following diagnosis-based risk factors for Extensor tendon disorders of the Wrist: Combination - force and wrist and hand repetition.	(Shiri et al., 2006)	Cross-sectional health survey
There is good evidence for the following diagnosis-based risk factors for Extensor tendon disorders of the Wrist: Combination - forceful exertion and repetition 6 hours.	(Descatha, Leclerc, Chastang, Roquelaure, & Study Group on Repetitive Work, 2003)	Observational cohort study
There is good evidence for the following diagnosis-based risk factors for Extensor tendon disorders of the Wrist: Combination force, repetition, & posture.	(National Institute of Occupational Safety and Health [NIOSH], 1997)	Review
There is good evidence for the following diagnosis-based risk factors for Flexor tendon disorders of the Wrist: Combination force, repetition, & posture.	(National Institute of Occupational Safety and Health [NIOSH], 1997)	Review
There is some evidence for the following diagnosis-based risk factors for Radial Tunnel Syndrome: Repetition and force - force of 1 kg with cycle time < 1 minute or awkward posture (static posture) elbow > 90 degrees.	(Roquelaure et al., 2000)	Matched case-control study



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