Clinical Practice Guideline: **Exercise Therapy for Treatment of Neck Pain**

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POLICY

American Specialty Health – Specialty (ASH) clinical committees have determined that exercise therapy is medically necessary for treatment of neck pain.

DESCRIPTION/BACKGROUND

Exercise therapy represents a very diverse group of treatment approaches, which makes summaries of "exercise therapy" as a whole difficult (Hayden et al., 2005). To date, the most recent systematic reviews of exercise therapy for neck pain have not addressed the role of specific exercise characteristics, and thus provide a very broad overview of exercise therapy. It is possible, that similar to the low back pain literature, the current and more traditional systematic reviews may underestimate the effects of specific types of exercise therapy for neck pain disorders.

Hayden et al. (2005) proposed the following specific characteristics of exercise: type, design, delivery, dose, and additional interventions.

Types of exercise therapy include muscle strengthening/stabilization/motor control exercises, stretching/flexibility, coordination/balance/proprioceptive exercises, and general fitness. Muscle strengthening typically involves repetitions of muscle contraction of specific muscle groups aimed to increase muscle strength and/or endurance (Abenhaim et al., 2000). Stretching/flexibility entail movements of one or more joints, intended to lengthen shortened muscles that can be static or dynamic in nature. Coordination and balance exercises involve training in specific movements aimed at improving proprioception and coordination of appropriate muscle groups (Johannsen et al., 1995; Kuukkanen & Malkia, 2000). Finally, general physical fitness routines typically include approaches involving the whole body (e.g., aerobic exercises) (Hayden et al., 2005).

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Exercise therapy can also be categorized in terms of program design. Individualized programs are those tailored to the individual based on the history and physical examination. Partially individualized programs involve standard types of exercises, but at varied intensity and/or duration. Finally, standard exercise programs are ones in which all participants receive the same exercise program (Hayden et al., 2005).

Exercise programs can also be delivered in several ways: home, supervised home with follow up, group supervision and individual supervision. Home exercise entails participants meeting initially with a therapist who provides them an exercise program to do at home, with no supervision or follow up. Home exercise with follow up involves the participants meeting initially with a therapist, doing the exercise program at home, and then having a follow up visit with the therapist at least every 6 weeks. In group supervised exercise, participants attend exercise sessions with 2 or more other individuals, under the guidance of a therapist. Finally, individually supervised exercise sessions entail individuals receiving one-on-one supervision (Hayden et al., 2005).

Dose or intensity of (measured by the duration and number of treatment sessions) is also an important characteristic of exercise therapy (Hayden et al., 2005). Programs involving 20 or more hours of exercise are defined as high dose, and those that involve less than 20 hours of intervention time are low dose. Factors such as load, resistance, and frequency of repetitions (which can more finely differentiate strengthening exercise into strengthening vs. endurance) may also be important when addressing exercise dose (Manniche & Jordan, 1995; Jordan et al., 1998).

There are several terms used to describe neck pain, including nonspecific neck pain, neck pain of unknown origin, and mechanical neck pain. Other descriptors are linked to precipitating factors such as whiplash associated disorders, occupational neck pain, and sports-related neck pain (Guzman et al., 2008b). Neck pain and disability appears to be attributable to several factors (Cote et al., 2008b; Hogg-Johnson, et al., 2008; Holm et al., 2008) and is unlikely to be related to a specific tissue pathology (Nordin et al., 2008).

The Neck Pain Task Force has proposed an expansion of the widely used Quebec Task Force on Whiplash Associated Disorders (Spitzer & Quebec Task Force, 1995), by integrating it with a pain classification system proposed by Von Korff et al. (1992). The new classification system includes all neck pain syndromes, irrespective of the professional background of the health care provider and the onset of pain (e.g., traffic collisions, sports, non-trauma). The Task Force recommends that assessment should lead to four distinct grades, which are summarized in Table 1.

The vast majority of existing literature on neck pain addresses Grades I and II neck pain. Neck pain is classified into 2 categories, nonspecific neck pain and whiplash associated disorders, with the appropriate grade when possible.

TABLE 1

Grade	Definition
Grade I	Neck pain and associated disorders with no signs or symptoms suggestive of major structural pathology and no or minor interference with activities of daily living. Major structural pathologies include (but are not limited to) fracture, vertebral dislocation, injury to the spinal cord, infection, neoplasm, or systemic disease including the inflammatory arthropathies.
Grade II	No signs or symptoms of major structural pathology, but major interference with activities of daily living.
Grade III	No signs or symptoms of major structural pathology, but presence of significant neurologic signs such as decreased deep tendon reflexes, weakness, or sensory deficits. NOTE: The presence of pain or numbness in the upper limb in the absence of definitive neurologic findings and confirmatory imaging studies does NOT warrant Grade III.
Grade IV	Signs or symptoms of major structural pathology.

EVIDENCE REVIEW

The literature addressing non-invasive therapies for neck pain has expanded greatly in recent years to include numerous primary studies and systematic reviews.

The work by Hurwitz et al. (2008) systematically identified relevant literature published from 1980 to early 2007, including 80 primary studies and 30 systematic reviews for non-invasive therapies for neck pain. Methodological quality of primary studies was evaluated. Those judged to have adequate internal validity were included in the best evidence synthesis. To be included, primary studies had to have at least 20 persons with neck pain resulting from whiplash associated disorders (WAD), work-related injuries and strains, or of unknown origin. Primary studies were NOT limited to randomized clinical trials (RCT) if they were judged to be of special relevance. Differences between groups in pain and disability were evaluated for clinical importance for each study, and summarized as =, + or -. Results were then synthesized qualitatively using informed scientific and clinical judgment, with greater weight given to the RCTs and large well-designed population-based cohort studies. Teasell et al. (2010) conducted a systematic review to evaluate the strength of evidence for various WAD noninvasive therapies. Identified studies were published from January 1980 through March 2009 that evaluated the effectiveness of any clearly defined treatment for acute (less than 2 weeks), subacute (2 to 12 weeks) or chronic (longer than 12 weeks) WAD. Twenty-two studies that met the inclusion criteria were identified, 12 of which were randomized controlled trials with 'good' overall methodological quality. For the treatment of chronic WAD, they found evidence to suggest that exercise programs are effective in relieving whiplash-related pain, at least over the short term. While the majority of a subset of 9 studies supported the effectiveness of interdisciplinary interventions, the 2 randomized controlled trials provided conflicting results. They concluded that based on the available research, exercise programs were the most effective noninvasive treatment for patients with chronic WAD, although many questions remain regarding the relative effectiveness of various exercise regimens.

An additional systematic review by Gross et al. (2007), on behalf of the Cervical Overview Group) represents an update of several Cochrane reviews of conservative treatments for neck disorders. While it was published after the cut-off point to be included in the Hurwitz et al. (2008) review, it includes literature through September 2004 making its primary sources less recent. To be included, primary studies had to be published or unpublished RCTs. Gross et al. (2007) also employed different approaches than Hurwitz et al. (2008) including utilization of an alternative neck pain classification system; calculation of standard mean differences, treatment advantage and NNTs (number needed to treat); categorization of findings by pre-defined levels of evidence; methodological quality assessment of primary studies with cutoff values of 50% on the van Tulder criteria list; and sensitivity analysis for methodological quality.

Hurwitz et al. (2008) based on consistent evidence from 3 RCTs, concluded that neck exercises alone, or in combination with SMT resulted in decreased pain and disability for sub-acute, chronic or recurrent neck pain when compared to SMT alone, TENS or general practitioner care in the short term. Based on 2 RCTs, they also found no differences between strengthening and endurance exercises in the short and long term. Based on one RCT they found that adding manual therapy or shortwave diathermy to exercise and advice did not improve short term disability and improvement. These findings lead the Task Force on Neck Pain to conclude that for non-specific neck pain (Grades I and II), exercise training would likely prove helpful for short term pain relief (Guzman et al., 2008a).

The review by Gross et al. (2007) came to slightly different conclusions. Based on 4 studies these authors determined there was strong evidence for both short and long-term effects of exercise (stretching and strengthening) in combination with mobilization/manipulation in terms of pain, function and global perceived effect for chronic mechanical neck pain and neck disorders with headache. This translated into a 28-70% treatment advantage over controls. They also found a long-term absolute benefit for strengthening/stretching exercise in pain reduction from baseline of 23-25mm (0-100) for 1 in 2-5 patients.

Gross et al. (2007) also found moderate evidence for long term benefit for improved disability favoring neck strengthening and stretching exercises based on 3 trials. The treatment advantage for exercise over controls ranged from 3-32% and the long-term absolute benefit for pain reduction was 11-28 mm for 1 in 2-15 patients. Two additional studies also provided moderate evidence for cervical proprioceptive training and eye fixation exercises for short term pain reduction and short and long term global perceived effect for chronic mechanical neck pain. The advantage of the treatment over controls was 32-34% and the benefit for pain reduction was 22-27mm for 1 in 4-5 patients (Gross et al., 2007). The Cochrane review by Kay et al. (2005) had similar results, concluding that the evidence indicates that there is a role for exercise in the treatment of acute and chronic mechanical neck disorder and neck disorder plus headache. Exercise for neck disorders with radicular findings was not assessed in this review. An updated Cochrane review in 2015 by Gross et al. identified relevant literature to May 2014. They included randomized controlled trials (RCTs) comparing single therapeutic exercise with a control for adults suffering from neck pain with or without cervicogenic headache or radiculopathy. They concluded that no high-quality evidence was found, indicating that there is still uncertainty about the effectiveness of exercise for neck pain. Using specific strengthening exercises as a part of routine practice for chronic neck pain, cervicogenic headache and radiculopathy may be beneficial. Research showed the use of strengthening and endurance exercises for the cervico-scapulothoracic region and shoulder may be beneficial in reducing pain and improving function. However, when only stretching exercises were used no beneficial effects may be expected. Future research should explore optimal dosage.

Côté et al. (2016) authored a clinical practice guideline on the management of neck pain and associated disorders: Their goal was to develop an evidence-based guideline for the management of grades I-III neck pain and associated disorders (NAD). This guideline was based on systematic reviews of high-quality studies. A multidisciplinary expert panel considered the evidence of effectiveness, safety, cost-effectiveness, societal and ethical values, and patient experiences (obtained from qualitative research) when formulating their recommendations. Authors recommended the following: 1: Clinicians should rule out major structural or other pathologies as the cause of NAD. Once major pathology has been ruled out, clinicians should classify NAD as grade I, II, or III; 2: Clinicians should assess prognostic factors for delayed recovery from NAD; 3: Clinicians should educate and reassure patients about the benign and self-limited nature of the typical course of NAD grades I-III and the importance of maintaining activity and movement. Patients with worsening symptoms and those who develop new physical or psychological symptoms should be referred to a physician for further evaluation at any time during their care; 4: For NAD grades I-II ≤3 months duration, clinicians may consider structured patient education in combination with range of motion exercise, multimodal care (range of motion exercise with manipulation or mobilization), or muscle relaxants. In view of evidence of no effectiveness, clinicians should not offer structured patient education alone, strain-counterstrain therapy, relaxation massage, cervical collar, electroacupuncture, electrotherapy, or clinic-based heat; 5: For NAD grades I-II >3 months duration, clinicians may consider structured patient education in combination with: range of motion and strengthening exercises, qigong, yoga, multimodal care (exercise with manipulation or mobilization), clinical massage, low-level laser therapy, or non-steroidal anti-inflammatory drugs. In view of evidence of no effectiveness, clinicians should not offer strengthening exercises alone, strain-counterstrain therapy, relaxation massage, relaxation therapy for pain or disability, electrotherapy, shortwave diathermy, clinic-based heat, electroacupuncture, or botulinum toxin injections; 6: For NAD grade III ≤3 months duration, clinicians may consider supervised strengthening exercises in addition to structured patient education. In view of evidence of no effectiveness, clinicians should not offer structured patient education alone, cervical collar, low-level laser therapy, or traction; 7: For NAD grade III >3 months duration, clinicians should not offer a cervical collar. Patients who continue to experience neurological signs and disability more than 3 months after injury should be referred to a physician for investigation and management; and 8: Clinicians should reassess the patient at every visit to determine if additional care is necessary, the condition is worsening, or the patient has recovered. Patients reporting significant recovery should be discharged.

Since 2006, additional randomized clinical trials have been identified investigating different types of exercise for nonspecific neck pain. Using a factorial design, Helewa et al. (2007) found a 6 week program of active exercise (to be done at home, with follow up) combined with a neck support pillow and heat/cold (control group), to be most advantageous in terms of pain at 12 weeks; neither exercise or pillow alone were more effective than heat/cold. Ylinen et al. (2007) found stretching exercises to be inferior to manual therapy in terms of disability after 4 weeks; no differences were noted between groups in terms of pain at the same time point or at 12 weeks. As this was a cross-over design study, in which the study treatments were switched at 4 weeks without a washout period, it is possible that the results are due to carry over effects of the original treatments. Tunwattanapong et al. (2016) determined the effectiveness of neck and shoulder stretching exercises for relief neck pain among office workers. A total of 96 subjects with moderate-to-severe neck pain (visual analogue score ≥5/10) for ≥3 months. All participants received an informative brochure indicating the proper position and ergonomics to be applied during daily work. The treatment group received the additional instruction to perform neck and shoulder stretching exercises two times/day, five days/week for four weeks. All outcomes were improved significantly from baseline. When compared between groups, the magnitude of improvement was significantly greater in the treatment group than in the control group for visual analogue scale; for Northwick Park Neck Pain Questionnaire; and for physical dimension of the Short Form-36. Compared with the patients who performed exercises <3 times/week, those who exercised ≥3 times/week yielded significantly greater improvement in neck function and physical dimension of quality-of-life scores. Authors concluded that a regular stretching exercise program performed for four weeks can decrease neck and shoulder pain and improve neck function and quality of life for office workers who have chronic moderate-to-severe neck or shoulder pain. The updated Cochrane review by Gross et al. (2015) came to the same conclusion. Gross et al. (2016) did an update of the Cochrane review in 2016 as well. Their goal was to assess the effectiveness of exercise on pain, disability, function, patient satisfaction, quality of life (QoL) and global perceived effect (GPE) in adults with neck pain. Authors concluded that specific strengthening exercises of the neck, scapulothoracic region and shoulder for chronic neck pain and chronic cervicogenic headache are beneficial and future research should explore optimal dosage.

In the study by Lansinger et al. (2007), 3 months of supervised Qigong exercise was compared to 3 months of exercise therapy (consisting of exercises intended to increase strength, endurance and circulation). The authors found no difference between groups in the proportion of patients improved in pain and disability; however, they did not define what constituted "improved" and a difference in VAS of 21 mm (median) at 12 weeks in favor of the exercise therapy group draws into question whether a different, and potentially more rigorous approach to the statistical analyses would have yielded different conclusions. In a small study by Andersen et al. (2008), specific neck training was compared to general fitness training and health counseling for "Trapezius Myalgia" (which can be considered a subset of nonspecific neck pain). The authors found the specific neck training group experienced greater pain reduction than the other two groups at 10 and 20 weeks; however, it is unclear whether the statistical analyses addressed group differences (verses within group differences).

Rolving et al. (2014) compared the effect of two different exercise programs on pain, strength and fear-avoidance belief. Participants were randomized to either general physical activity (GPA group) or GPA and additional strength training of the neck and shoulder (SST group). The primary outcome was pain intensity. Secondary outcomes were muscle strength of the neck and shoulder and fear-avoidance belief. Authors conclude that this study indicates that in rehabilitation of subjects severely disabled by non-specific neck pain, there is no additional improvement on pain or muscle strength when neck exercises are given as a home-based program with a minimum of supervision. However, strength training of the painful muscles seems to be effective in decreasing fear-avoidance beliefs. O'Riordan et al. (2014) sought to identify the most effective components in an active exercise physiotherapy treatment intervention for chronic neck pain based on the frequency, intensity, time, and type (FITT) exercise method of tailoring physical activity recommendations to the individual needs and goals of patients. Authors concluded that physiotherapy interventions using a multimodal approach appear to produce more beneficial outcomes in terms of increased strength, improved function, and health-related quality of life and reduced pain scores. Active strengthening exercises appear to be beneficial for all of these outcomes; the inclusion of additional stretching and aerobic exercise components appear to enhance the benefits of an exercise intervention.

Celenay et al. (2016) compared the effects of stabilization exercises plus manual therapy to those of stabilization exercises alone on disability, pain, range of motion (ROM), and quality of life in patients with mechanical neck pain (MNP). A total of 102 patients with MNP (18-65 years of age) were recruited and randomly allocated into 2 groups: stabilization exercise without ($n = 51$) and with ($n = 51$) manual therapy. The program was carried out 3 days per week for 4 weeks. The Neck Disability Index, visual analog pain scale, digital algometry of pressure pain threshold, goniometric measurements, and Medical Outcomes Study 36-Item Short-Form Health Survey were used to assess participants at baseline and after 4 weeks. The results of this study suggest that stabilization exercises with manual therapy may be superior to stabilization exercises alone for improving disability, pain intensity at night, cervical rotation motion, and quality of life in patients with MNP.

Dunleavy et al. (2016) sought to determine the effectiveness of Pilates and yoga group exercise interventions for individuals with chronic neck pain (CNP). Fifty-six individuals with CNP scoring ≥3/10 on the numeric pain rating scale for >3 months (controls n=17, Pilates n=20, yoga n=19). Exercise participants completed 12 small-group sessions with modifications and progressions supervised by a physiotherapist. The primary outcome measure was the Neck Disability Index (NDI). Secondary outcomes were pain ratings, range of movement and postural measurements collected at baseline, 6 weeks and 12 weeks. Follow-up was performed 6 weeks after completion of the exercise classes (Week 18). NDI decreased significantly in the Pilates and yoga groups with no change in the control group. Pain ratings also improved significantly. Moderate-to-large effect sizes (0.7 to 1.8) and low numbers needed to treat were found. There were no differences in outcomes between the exercise groups or associated adverse effects. No improvements in range of movement or posture were found. Authors concluded that Pilates and yoga group exercise interventions with appropriate modifications and supervision were safe and equally effective for decreasing disability and pain compared with the control group for individuals with mild-to-moderate CNP.

Southerst et al. (2016) sought to update the findings of the findings of the Neck Pain Task Force (NPTF) on the effectiveness of exercise for the management of neck pain and WAD grades I to III. For the management of recent neck pain Grade I/II, unsupervised range-of-motion exercises, nonsteroidal anti-inflammatory drugs and acetaminophen, or manual therapy lead to similar outcomes. For recent neck pain Grade III, supervised graded strengthening is more effective than advice but leads to similar short-term outcomes as a cervical collar. For persistent neck pain and WAD Grade I/II, supervised qigong and combined strengthening, range-of-motion, and flexibility exercises are more effective than wait list. Additionally, supervised Iyengar yoga is more effective than home exercise. Finally, supervised high-dose strengthening is not superior to home exercises or advice. We found evidence that supervised qigong, Iyengar yoga, and combined programs including strengthening, range of motion, and flexibility are effective for the management of persistent neck pain. Authors did not find evidence that one supervised exercise program is superior to another. Overall, most studies reported small effect sizes suggesting that a small clinical effect can be expected with the use of exercise alone.

Ris et al. (2016) investigated the effect of combining pain education, specific exercises and graded physical activity training (exercise) compared with pain education alone (control) on physical health-related quality of life (HR-QoL) in chronic neck pain patients. This study was a multicenter randomized controlled trial of 200 neck pain patients receiving pain education. The exercise group received additional exercises for neck/shoulder, balance and oculomotor function, plus graded physical activity training. Patient-reported outcome measures and clinical tests were recorded at baseline and after 4 months. The exercise group showed statistically significant improvement in physical HR-QoL, mental HR-QoL, depression, cervical pressure pain threshold, cervical extension movement, muscle function, and oculomotion. Per protocol analyses confirmed these results with additional significant improvements in the exercise group compared with controls. Bussières et al. (2016) developed a clinical practice guideline on the management of neck pain-associated disorders (NADs) and whiplash-associated disorders (WADs). This guideline replaced 2 prior chiropractic guidelines on NADs and WADs. Authors suggest that for recent-onset (0-3 months) neck pain, multimodal care; manipulation or mobilization; range-of-motion home exercise, or multimodal manual therapy (for grades I-II NAD); supervised graded strengthening exercise (grade III NAD); and multimodal care (grade III WAD) should be offered. For persistent (>3 months) neck pain, they suggest offering multimodal care or stress self-management; manipulation with soft tissue therapy; high-dose massage; supervised group exercise; supervised yoga; supervised strengthening exercises or home exercises (grades I-II NAD); multimodal care or practitioner's advice (grades I-III NAD); and supervised exercise with advice or advice alone (grades I-II WAD). For workers with persistent neck and shoulder pain, evidence supported mixed supervised and unsupervised high-intensity strength training or advice alone (grades I-III NAD). Authors concluded that a multimodal approach including manual therapy, self-management advice, and exercise is an effective treatment strategy for both recent-onset and persistent neck pain.

The Ontario Guidelines state that for the management of persistent neck pain grades I–II, clinicians may consider structured patient education in combination with range of motion and strengthening exercises, qigong, yoga, multimodal care (exercise with manipulation or mobilization), clinical massage, low-level laser therapy, or non-steroidal anti-inflammatory drugs (Cote et al., 2016). In the 2017 revision of the JOSPT guidelines for neck pain, for patients with acute neck pain with mobility deficits, clinicians should provide thoracic manipulation, a program of neck ROM exercises, and scapulothoracic and upper extremity strengthening to enhance program adherence (Blanpied et al., 2017). For patients with chronic neck pain with mobility deficits, clinicians should provide a multimodal approach of the following: thoracic manipulation and cervical manipulation or mobilization; 2) mixed exercise for cervical/scapulothoracic regions: neuromuscular exercise (e.g., coordination, proprioception, and postural training), stretching, strengthening, endurance training, aerobic conditioning, and cognitive affective elements; dry needling, laser, or intermittent mechanical/manual traction (Blanpied et al., 2017). In another guideline, Bier et al. (2018) states that in case of a normal recovery, management of cervical pain should be hands-off, and patients should receive advice from the physical therapist and possibly some simple exercises to supplement "acting as usual. "In case of a delayed/deviant recovery, the physical therapist is advised to use, in addition to advice, forms of mobilization and/or manipulation in combination with exercise therapy (Bier et al., 2018). In an AHRQ publication on non-invasive treatments for chronic pain by Skelly et al. (2018), for patients with chronic neck pain, at short and intermediate terms, acupuncture and Alexander Technique were associated with slightly improved function compared with usual care (both interventions), sham acupuncture, or sham laser, but no improvement in pain was seen at any time. Combination exercise (any 3 of the following: muscle performance, mobility, muscle re-education, aerobic) demonstrated a slight improvement in pain and function short and long term (Skelly et al., 2018).

Li et al. (2019) aimed to quantitatively summarize the efficacy of yoga for treating chronic non-specific neck pain (CNNP). Authors included only randomized controlled trials (RCTs) and q-RCTs evaluating the effects of yoga on patients with CNNP. The primary outcomes for this review were pain and disability, and the secondary outcomes were cervical range of motion (CROM), quality of life (QoL), and mood. Trials that examined the clinical outcomes of yoga intervention in adults with CNNP compared with those of other therapies except yoga (e.g., exercise, Pilates, usual care, et al) were included. A total of 10 trials ($n = 686$) comparing yoga and interventions other than yoga were included in the meta-analysis. The results show that yoga had a positive effect on neck pain intensity, neck pain-related functional disability, CROM, QoL, and mood. Authors concluded that it was difficult to make a comprehensive summary of all the evidence due to the different session and duration of the yoga interventions, and the different outcome measurement tools in the study. Given this, authors draw a very cautious conclusion that yoga can relieve neck pain intensity, improve pain-related function disability, increase CROM, improve QoL, and boost mood.

de Zoete et al. (2020) compared the effectiveness of different physical exercise interventions for chronic non-specific neck pain in a systematic review and meta-analysis. Randomized controlled trials (RCTs) describing the effects of any physical exercise intervention in adults with chronic non-specific neck pain were eligible for inclusion. Their search returned 6,549 records and 40 studies were included. Compared with no treatment, three exercise interventions were found to be effective for pain and disability: motor control, yoga/Pilates/Tai Chi/Qigong, and strengthening. Other interventions, including range of motion, balance and multimodal (3 or more exercise types combined) exercises showed uncertain or negligible effects. The quality of evidence was very low according to the GRADE (Grading of Recommendations Assessment, Development and Evaluation) criteria. Authors concluded that there is not one superior type of physical exercise for people with chronic non-specific neck pain. Rather, there is very low-quality evidence that motor control, yoga/Pilates/Tai Chi/Qigong and strengthening exercises are equally effective. Daher et al. (2020) examined the effect of adding aerobic exercise (AE) to neck-specific exercise treatment for patients with neck pain (NP) to reduce pain and disability. Patients with NP were randomly assigned to six weeks of neck-specific exercise with and without the addition of AE. Patients were classified as having a successful or non-successful outcome according to the Global Rating of Change (GROC). Outcome measures included Visual Analogue Scale (VAS), Neck Disability Index (NDI), Fear Avoidance Beliefs Questionnaire (FABQ) and cervicogenic headache. Assessments were performed at six-week, and three- and six-month follow-ups. A total of 139 participants (mean age: 54.6 ± 10.5 years) were recruited (*n* = 69 AE, *n* = 70 control). According to GROC, 77.4% of the AE group reported a successful outcome at six months vs. 40% in the control group (P < 0.001). There was a significant reduction in VAS from baseline to six months in the AE vs. control group, respectively (P < 0.001). Significant improvements were also obtained for NDI and FABQ from baseline to six weeks in the AE group. The AE group also demonstrated significant reduction in cervicogenic headache from baseline to six months (P = 0.003). Authors concluded that adding AE to long-term neck-specific exercises is an effective treatment for reducing NP and headache in patients with NP.

Price et al. (2020) synthesized evidence on the effectiveness of different ET programs to reduce chronic non-specific neck pain (CNSNP) and associated disability, and whether dosage affects outcomes. Twenty-six trials from 3,990 citations (*n* = 2,288 participants) investigated fifteen ET programs. Findings demonstrate that a range of ET programs reduce pain/disability in the short term (low to moderate evidence). Pillar exercises reduce pain/disability in the intermediate term (low level evidence). Moderate to very large pain reduction is found with ET packages that include motor control + segmental exercises (low to moderate evidence). No high-quality trials investigated long term outcomes. Increased frequency of motor control exercises and progressively increased load of pillar exercise may improve effectiveness. Authors concluded that motor control + segmental exercises are the most effective ET to reduce short term pain/disability, but long-term outcomes have not been investigated. Optimal motor control + segmental exercise variables and dosage is unknown and requires clarification. Wilhelm et al. (2020) evaluated whether exercise therapy is effective for managing neck pain and investigated the relationship between exercise therapy dosage and treatment effect in an intervention systematic review with meta-analysis and meta-regression. Fourteen trials were included in the review. Results indicated that exercise therapy was superior to control for reducing pain (visual analog scale mean difference, -15.32 mm) and improving disability (Neck Disability Index mean difference, -3.64 points). Exercise dosage parameters did not predict pain or disability outcomes. Authors concluded that exercise was beneficial for reducing pain and disability, regardless of exercise therapy dosage. Therefore, optimal exercise dosage recommendations remain unknown. They encourage clinicians to use exercise when managing mechanical neck pain.

Skelly et al. (2020) updated the evidence from their 2018 report assessing persistent improvement in outcomes following completion of therapy for noninvasive nonpharmacological treatment for selected chronic pain conditions. They included 233 RCTs (31 new to this update). Many were small (*N*<70), and evidence beyond 12 months after treatment completion was sparse. The most common comparison was with usual care. Evidence on harms was limited, with no evidence suggesting increased risk for serious treatment-related harms for any intervention. Effect sizes were generally small for function and pain. For chronic neck pain they found the following relative to exercise: Exercise in general improved function long term, and combination exercise improved function and pain both short and long term compared with usual care (SOE: low) and compared with acetaminophen, Pilates improved both function and pain (SOE: low).

Lin et al. (2021) evaluated the effects of sling exercise on pain intensity, disability, and health-related quality of life in adults with neck pain in a review. Eleven randomized controlled trials were included (*n* = 595). The mean total PEDro score was 4.64 (SD = 1.21) of 10, which indicated a fair methodological quality. The intervention groups showed significant improvements in pain intensity immediately postintervention compared with the control groups. No significant effects were found for disability, cervical range of motion, and health-related quality of life. However, sensitivity analyses revealed significant short-term improvements in pain intensity, disability, and cervical range of motion and sustained effects on disability at intermediate-term follow-up. Authors concluded that sling exercise appears to be beneficial for improvements in pain intensity (moderate- to low-level evidence) among patients with neck pain. However, no definitive conclusion could be made regarding the effect of sling exercise for neck pain due to methodological limitations and high heterogeneity in the included studies.

Espí-López et al. (2021) compared the effectiveness of two therapeutic exercise programs (i.e., cervical proprioception and cervical mobility) in reducing pain and disability in individuals with nonspecific neck pain. We further aimed to compare the effectiveness of the two treatments in improving pressure pain threshold, cervical range of motion and head repositioning accuracy. Forty-two participants diagnosed with nonspecific neck pain, aged 18-65 years, were randomized to a cervical mobility group (*N*.=22) or a proprioception group (*N*.=20). The cervical mobility group combined a passive treatment and active mobility exercises, whereas the Proprioception group combined a passive treatment and proprioceptive exercises. Pain intensity, disability, pressure pain threshold, range of motion, and head repositioning accuracy were assessed at baseline and after 10 sessions.
Pain intensity and disability significantly improved for both interventions, but such improvement was greater for pain intensity in the proprioception group than in the cervical mobility group. Pressure pain threshold, range of motion and head repositioning accuracy improved only in the proprioception group. Authors concluded that a program based on cervical proprioception exercises demonstrated to improve pain, disability, pressure pain threshold, range of motion and head repositioning accuracy in patients with nonspecific neck pain. However, a program based on cervical mobility exercises only showed to improve pain intensity and disability, while such improvement was not clinically relevant.

Chrcanovic et al. (2021) evaluated the effect of exercise therapy in patients with Whiplash-Associated Disorders for the improvement of neck pain and neck disability, compared with other therapeutic interventions, placebo interventions, no treatment, or waiting list. The search identified 4,103 articles. After removal of duplicates, screening of 2,921 abstracts and full text assessment of 100 articles, 27 articles that reported data for 2,127 patients were included. The included articles evaluated the effect of exercise therapy on neck pain, neck disability or other outcome measures and indicated some positive effects from exercise, but many studies lacked control groups not receiving active treatment. Studies on exercise that could be included in the random-effect meta-analysis showed significant short-term effects on neck pain and medium-term effects on neck disability. Authors concluded that despite a large number of articles published in the area of exercise therapy and Whiplash-Associated Disorders, the current evidence base is weak. The results from the present review with meta-analysis suggests that exercise therapy may provide additional effect for improvement of neck pain and disability in patients with Whiplash-Associated Disorders.

Ouellet et al. (2021) compared the efficacy of region-specific exercises to general exercises approaches for adults with spinal or peripheral musculoskeletal disorders (MSKDs). Randomized control trials (RCTs) on the efficacy of region-specific exercises compared to general exercises approaches for adults with various MSKDs. Based on low-quality evidence in the short-term and very low-quality in the mid- and long-term, there were no statistically significant differences between region-specific and general exercises in terms of pain and disability reductions for adults with spinal disorders or knee OA. Secondary analyses for pain reduction in the short-term for neck or low back disorders did not report any statistically significant differences according to very low- to low-quality of evidence. In a secondary study, Daher et al. (2022) sought to identify subgroups of patients in the combined exercises group most likely to benefit from the intervention. Sixty-nine patients were included. The original trial was conducted in multiple physical therapy outpatient clinics twice a week for 6 weeks; follow-up was 6 months after assignment. The primary outcome was the therapeutic success rate (Global Rating of Change Score ≥ +5, "quite a bit better") after 6 weeks of training and at the 6-month follow-up. Candidate predictors from patients' medical history and physical examination were selected for univariable regression analysis to determine their association with treatment response status. Multivariable logistic regression analysis was used to derive preliminary clinical prediction rules. The clinical prediction rule contained 3 predictor variables: (1) symptom duration ≤6 months, (2) neck flexor endurance ≥18 seconds, and (3) absence of referred pain. The pre-test probability of success was 61.0% in the short term and 77.0% in the long term. The post-test probability of success for patients with at least 2 of the 3 predictor variables was 84.0% in the short term and 87.0% in the long term; such patients will likely benefit from this program. Authors concluded that a simple 3-item assessment, derived from easily obtainable baseline data, can identify patients with NP who may respond best to combined aerobic and neck-specific exercises. Validation is required before clinical recommendation.

Villanueva-Ruiz et al. (2022) compared the effectiveness of specific neck exercises (SNE) with that of alternative exercise interventions (AEI) for reducing pain and disability in people with nonspecific neck (NSNP) and to assess whether the effectiveness of SNE is increased when the exercises are tailored and provided to patients with evidence of motor control dysfunction. Twelve studies were included. Meta-analysis revealed greater effectiveness of SNE in the short to medium term for reducing pain and disability but no differences in the long term for pain and disability, although evidence was limited for the latter. The effectiveness of SNE was not superior in studies that included only participants with motor control dysfunction or when exercises were tailored to each participant. Overall, the studies were of low quality. Authors concluded that the preferential use of SNE may be recommended to achieve better short- to medium-term outcomes, although the low quality of evidence affects the certainty of these findings. Currently used strategies for selecting patients and tailoring SNE are not supported by the evidence and therefore cannot be recommended for clinical practice. Evidence suggests SNE are more effective than other forms of exercise, although evidence is overall of low quality. Use of the craniocervical flexion test in isolation to select participants and/or tailor SNE cannot be recommended.

Garzonio et al. (2022) assessed the effectiveness of specific exercises that recruit the deep cervical muscles compared to other types of exercises or interventions and minimal or no treatment. The review identified a total of 2,397 records. Sixteen articles were included in the qualitative synthesis, and 9 studies were included in the meta-analysis. The pooled results found moderate- to very low-quality evidence that deep cervical muscle exercise protocols are not superior to other types of active exercises in reducing the intensity of pain in people with NSNP. Studies not included in the meta-analysis suggest that specific exercises induce better effects that are superior to those of nontreatment with clinically relevant results. There has been no consensus on exercise type and dosage for the management of NSNP. This study shows that exercises are a useful tool and that the effect of an exercise program that recruits deep cervical muscles seems to be comparable to the effect of other types of active exercises on pain intensity reduction. Ireland et al. (2022) systematically reviewed the literature investigating the relationship between participation in exercise intended to improve fitness or sport and the prevalence of non-specific neck pain in adults. A secondary objective evaluated if exercise characteristics (frequency, and total duration of weekly exercise) impacted any observed relationship between this form of exercise and neck pain prevalence. Studies were deemed eligible if they investigated the relationship between exercise participation and prevalence of non-specific neck pain. Due to heterogeneity of characteristics in the included studies, a meta-analysis was not deemed feasible. Data were randomized using narrative synthesis with subgroup analysis of exercise themes including frequency, and total weekly duration. Fair to good quality evidence from eight studies indicated that regular participation in exercise intended for fitness or sport was associated with a reduced prevalence of neck pain in adults. Three cross-sectional studies reported a positive relationship between greater weekly exercise

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duration and reduced neck pain prevalence. Authors concluded that the results of this review provide preliminary evidence of a potential protective effect of participation in exercise intended for fitness or sport on the prevalence of non-specific neck pain in the community. This protective relationship appeared to be stronger when exercise was undertaken for a greater total weekly duration.

Hernandez-Lucas et al. (2022) determined if the combination of exercise plus education is more effective for the prevention of non-specific back pain than usual medical care in a systematic review with meta-analysis. A total of 4 randomized controlled trials were selected. The meta-analysis showed statistically significant differences in the pain intensity and in disability. Authors concluded that interventions combining exercise and education seem to have a greater preventive effect on non-specific back pain than usual medical care.

Yang et al. (2022) evaluated the effects of isometric training interventions on the treatment of patients with neck pain in a meta-analysis. The meta-analysis results showed that isometric training can reduce visual analogue scale scores of patients' (weighted mean difference; decrease patients neck disability index score, isometric training was better than the control group; in improving patients' motion of the sagittal plane) weighted mean difference, coronal plane, horizontal plane, isometric training was superior to the control group. More than 20 isometric training interventions had more significant effects on visual analogue scale and range of motion. And isometric training for more than 8 weeks had more significant effects on the visual analogue scale and neck disability index scores. Authors concluded that isometric training has significant effects on relieving neck pain, improving neck dysfunction, and improving joint mobility. However, the two indicators of visual analogue scale and neck disability index had more influential factors; the sample size of most studies was relatively small, and the intervention measures in the control group were relatively simple.

Senarath et al. (2023) evaluated the exercise-induced hypoalgesic (EIH) effects of different types of physical exercise in individuals with neck pain. EIH is characterized by increased pain threshold, pain tolerance, and/or decreased sensitivity to painful stimuli or unpleasantness, which may last up to 30 min after a single bout of exercise. Eleven articles were included in this review; 9 with low risk of bias and 2 with some concerns about the risk of bias. Three studies with chronic whiplash-associated disorders (WAD) were included in the meta-analysis with results demonstrating that isometric exercise had a larger EIH effect at the local testing site compared with submaximal aerobic exercises, submaximal aerobic and isometric exercises had equal EIH effects at the remote testing site, and submaximal aerobic exercises exerted comparably larger EIH effect at the remote testing site than local testing site. The certainty of evidence (GRADE) for these analyses was low to very low. According to the descriptive analysis of the studies of chronic nonspecific neck pain, isometric and range of motion (ROM) exercises have shown EIH effects. Active stretching exercises have illustrated contradictory effects. Authors concluded that isometric and ROM exercises exerted hypoalgesia at local and remote sites. A larger EIH effect following submaximal aerobic exercises was exerted at the remote testing site compared with the local site.

Rasmussen-Barr et al. (2023) aimed to summarize the literature on the effect of various exercise types used in chronic neck pain and to assess the certainty of the evidence in a systematic review and meta-analysis of systematic reviews. To date, no consensus exists as to whether one exercise type is more effective than another in chronic neck pain. The included reviews were grouped into motor control exercise (MCE), Pilates exercises, resistance training, traditional Chinese exercise (TCE), and yoga. A narrative analysis of the results was performed and in addition, meta-analyses when feasible. Their database search resulted in 1,794 systematic reviews. They included 25 systematic reviews and meta-analyses including 17,321 participants (overlap not accounted for). The quality of the included reviews ranged from critically low to low (n = 13) to moderate to high (n = 12). Authors found low to high certainty of evidence that MCE, Pilates exercises, resistance training, TCE, and yoga have short-term positive effects on pain and that all exercise types except resistance training, show positive effects on disability compared to non-exercise controls. They found low to moderate certainty of evidence for conflicting results on pain and disability when the exercise types were compared to other exercise interventions in the short-term as well as in intermediate/long-term apart for yoga, as no long-term results were available. Authors concluded that overall, findings show low to high certainty of evidence for positive effects on pain and disability of the various exercise types used in chronic neck pain compared to non-exercise interventions, at least in the short-term. Based on our results, no optimal exercise intervention for patients with chronic neck pain can be recommended, since no large differences between the exercise types were shown here. Because the quality of the included systematic reviews varied greatly, future systematic reviews need to increase their methodological quality.

Teichert et al. (2023) updated the evidence on the effectiveness of exercise interventions to prevent episodes of neck pain. Randomized controlled trials (RCTs) that enrolled adults without neck pain at baseline and compared exercise interventions to no intervention, placebo/sham, attention control, or minimal intervention were included. Of 4,703 records screened, 5 trials (1,722 participants at baseline) were included and eligible for meta-analysis. Most (80%) participants were office workers. Risk of bias was rated as some concerns for 2 trials and high for 3 trials. There was moderate-certainty evidence that exercise interventions probably reduce the risk of a new episode of neck pain compared to no or minimal intervention in the short-term (≤12 months). The results were not robust to sensitivity analyses for missing outcome data. Authors concluded that there was moderate-certainty evidence supporting exercise interventions for reducing the risk for an episode of neck pain in the next 12 months. The clinical significance of the effect is unclear.

Cho et al. (2023) investigated the effects of exercise therapy (ET) on pain and disability in patients with chronic non-specific neck pain (NNP). Existing systematic reviews and meta-analyses have only focused on patients with chronic non-specific neck pain (NNP), analyzing exercise therapy (ET) only as therapeutic exercise. Therefore, authors felt it was necessary to comprehensively review the effects of ET through a meta-analysis comprising a wide range of ETs that are not limited to therapeutic exercise. Twenty-one studies were included. The effects of ET on pain and disability in patients with chronic NNP were significantly different for pain and disability. The effects of ET on pain (ET vs control; ET vs sham therapy) and disability (ET vs control; ET vs sham therapy) in NNP patients were significantly different. Authors concluded that this study verified the efficacy of ET in improving pain and disability in patients with chronic NNP. However, evidence supporting the efficacy of ET in patients with acute and subacute NNP is still lacking.

Wilhelm et al. (2023) performed a systematic review and meta-analysis to determine the effect of manual therapy combined with exercise on pain, disability, and quality of life in individuals with nonspecific neck pain. Manual therapy and exercise are two standard treatment approaches to manage neck pain. In addition, clinical practice guidelines recommend a multi-modal approach, including both manual therapy and exercise for the treatment of neck pain; however, the specific effects of these combined interventions have not recently been reported in the literature. Twenty-two studies were included in the final review. With moderate certainty of evidence, three studies demonstrated no significant difference between manual therapy plus exercise and manual therapy alone in pain or disability. With a low certainty of evidence, 16 studies demonstrated that manual therapy plus exercise is significantly better than exercise alone for reducing pain. Similarly, with low certainty of evidence, 13 studies demonstrated that manual therapy plus exercise is significantly better than exercise alone for reducing disability. Four studies demonstrated that manual therapy plus exercise is significantly better than a control intervention for reducing pain (moderate certainty) and disability (low certainty). With a high certainty of evidence, four studies demonstrated no significant difference between manual therapy plus exercise and exercise alone in quality of life. Authors concluded that based on this systematic review and meta-analysis, a multi-modal treatment approach including exercise and manual therapy appears to provide similar effects as manual therapy alone but is more effective than exercise alone or other interventions (e.g., control, placebo, 'conventional physical therapy') for the treatment of nonspecific neck pain and related disability. Some caution needs to be taken when interpreting these results given the general low to moderate certainty of the quality of the evidence.

Gao et al. (2024) compared the efficacy of different mind-body exercise (MBE) interventions, including Yoga, Pilates, Qigong, and Tai Chi, in managing chronic non-specific neck pain (CNNP) in a systematic review and network meta-analysis. Of the 1,019 studies retrieved, 18 studies with 1,442 subjects were included. Fourteen studies were graded as high quality. Yoga plus hot sand fomentation was the most effective in reducing pain intensity and functional disability and improving the quality of physical life in patients with CNNP. Yoga achieved the most improvement in cervical mobility, and Pilates was the best MBE intervention for improving the quality of mental life. Overall, Yoga, Pilates, Qigong, and Tai Chi demonstrated considerable effectiveness in improving pain intensity, functional disability, cervical mobility, and quality of life in patients with CNNP. Yoga or Yoga plus heat therapy was the most effective method for patients with CNNP. Additional high-quality, large-scale, multi-center, long-term follow-up studies are necessary to fully understand the comparative effectiveness of different MBE interventions for CNNP, and to recognize the potential benefits of each MBE intervention and the need for individualized treatment approaches.

Jones et al. (2024) evaluated the effect of exercise on pain, disability, and quality of life (QoL) in office workers with chronic neck pain. Eight randomized controlled trials met the eligibility criteria. Seven studies reported a significant decrease in Visual Analogue Scale (VAS) scores for neck pain intensity and five studies reported a significant decrease in Neck Disability Index (NDI) scores following strengthening exercises. Only one study assessed the effect of strengthening exercises on QoL and reported no significant effect. All 8 included studies had a high risk of bias, and the overall certainty of evidence was low. Meta-analyses demonstrated a significant decrease of neck pain intensity and disability for strengthening exercises compared to a control. Authors concluded that there is low certainty of evidence that strengthening of the neck, shoulder and scapular musculature is effective at reducing neck pain and disability in office workers. Further research evaluating the effect of exercise on QoL is required.

Chen et al. (2024) evaluated the effects of scapular targeted therapy on neck pain and function in patients with chronic neck pain (CNP). Studies have shown that shoulder blade function might be related to chronic neck pain. A total of 313 participants were included from 8 RCTs. Compared with those in the control group, the intervention in the scapular treatment group exhibited greater improvement in pain intensity, with moderate evidence. Subgroup analysis for pain intensity revealed a significant difference between the sexes, with only the female population showing better outcomes than those with both sexes. However, moderate evidence demonstrated no improvement in neck disability after scapular treatment of Neck Disability Index or Northwick Park Neck Pain Questionnaire. No effect of scapular treatment was shown on the pressure pain threshold (PPT). The cervical range of motion (CROM) and electromyographic activity of neck muscles could not be conclusively evaluated due to limited support in the articles, and further study was needed. However, the patient's head forward posture appeared to be corrected after scapular treatment. Authors concluded that scapular therapy was beneficial for relieving pain intensity in patients with CNP, especially in women. Head forward posture might also be corrected with scapular therapy. However, scapular therapy may have no effect on the PPT or neck disability. However, whether scapular therapy could improve CROM and cervical muscle activation in patients with CNPs had not been determined and needed further study.

PRACTITIONER SCOPE AND TRAINING

Practitioners should practice only in the areas in which they are competent based on their education, training, and experience. Levels of education, experience, and proficiency may vary among individual practitioners. It is ethically and legally incumbent on a practitioner to determine where they have the knowledge and skills necessary to perform such services and whether the services are within their scope of practice.

It is best practice for the practitioner to appropriately render services to a patient only if they are trained, equally skilled, and adequately competent to deliver a service compared to others trained to perform the same procedure. If the service would be most competently delivered by another health care practitioner who has more skill and training, it would be best practice to refer the patient to the more expert practitioner.

Best practice can be defined as a clinical, scientific, or professional technique, method, or process that is typically evidence-based and consensus driven and is recognized by a majority of professionals in a particular field as more effective at delivering a particular outcome than any other practice (Joint Commission International Accreditation Standards for Hospitals, 2020).

Depending on the practitioner's scope of practice, training, and experience, a member's condition and/or symptoms during examination or the course of treatment may indicate the need for referral to another practitioner or even emergency care. In such cases it is prudent for the practitioner to refer the member for appropriate co-management (e.g., to their primary care physician) or if immediate emergency care is warranted, to contact 911 as appropriate. See the *Managing Medical Emergencies (CPG 159 – S)* clinical practice guideline for information.

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