

Management of Whiplash Associated Disorders

Guidelines 2014

A **clinical practice guideline** is a document designed to guide decisions and criteria regarding diagnosis, management, and treatment in specific areas of healthcare. Contemporary **clinical practice guidelines** are based on an examination of current evidence (evidence-based). The goal of **clinical practice guidelines** is to optimize patient benefit, reduce risks, provide a rational basis for patient referral, and to be cost effective. Healthcare providers are obliged to know the guidelines of their profession. Importantly, **clinical practice guideline** may not be applicable to the circumstances of an individual patient.

The Institute of Medicine defines **clinical practice guidelines** as (1):

“Systemically developed statements to assist practitioners’ and patient decisions about appropriate health care for specific clinical circumstances.”

Clinical practice guidelines have great potential for good, but also for abuse. Consequently, our government keeps an eye on **clinical practice guidelines** through the United States Department of Health & Human Services (2) and its Agency for Healthcare Research and Quality (3), where they have created the National Guideline Clearinghouse (4). The National Guideline Clearinghouse is a “public resource for evidence-based clinical practice guidelines.” It keeps a catalog of high-quality guidelines published by various organizations.

The most recent (March 2014, (5)) **clinical practice guidelines** pertaining to *Whiplash Associated Disorders* were edited by Charles G. Davis, DC. It is titled Management of Whiplash Associated Disorders. These **Guidelines** have been accepted for inclusion in the National Guideline Clearinghouse (NGC-7408).

Dr. Davis is a whiplash injury/chronic pain expert with impressive credentials, including clinician, team doctor, teacher, published researcher, and political leader. He teaches a course pertaining to the biomechanics of low-speed rear-end automobile collisions through the University of California, Riverside. He has four articles in the US National Library of Medicine pertaining to whiplash biomechanics and chronic pain neurophysiology (6, 7, 8, 9).

The Management of Whiplash Associated Disorders 2014 **Guidelines** is 217 pages in length, consists of approximately 1,200 references, and covers the following topics:

RANGE OF SYMPTOMS

STRUCTURES INJURED

EVALUATION

RED FLAGS

CRITERIA FOR DISCHARGE

GRADES OF SEVERITY OF INJURY

TREATMENT INTERVENTIONS AND PRINCIPLES OF TREATMENT

TREATMENT FREQUENCY AND DURATION

CHRONIC TREATMENT

OUTCOME MEASURES

ICD-10 CODES

RANGE OF SYMPTOMS

- Neck Pain
- Shoulder Pain
- Arm Pain/Paresthesias
- Interscapular Pain
- Back Pain
- Headache
- Dizziness / Vertigo
- Visual Disturbances
- Temporomandibular Joint (TMJ) Symptoms
- Cognitive / Psychological Symptoms
- Carpal Tunnel Syndrome
- Sleep Disturbance

It is common for symptoms to be delayed for 24-72 hours. Disc injuries can be delayed for weeks to months.

Children are commonly injured (and killed) from motor vehicle collisions.

Whiplash injuries accelerate degenerative spinal disease (spondylosis).

STRUCTURES INJURED

- Vehicle damage is not a reliable indicator of patient or passenger injury. Rather, post-traumatic symptoms, signs, and psychological issues are primarily as a consequence of an individual's unique susceptibility, an unpredictable variable.
- Rear-end collision injury occurs very quickly following the impact, in less than a tenth of a second when the neck forms a nonphysiological "S" configuration, with flexion of the upper cervical spine and hyper-extension occurring in the lower cervical spine.
- Although many different tissues can be injured during the collision, the most probable injuries are to the facet joint capsules and the annulus of the intervertebral disc.
- Whiplash mechanisms also often result in injuries to the alar ligaments of the upper cervical spine.
- Whiplash mechanisms are a leading cause of injury to the vertebral arteries.
- A number of factors have been identified as increasing the risk of injuries:
 - Being caught by surprise at the moment of impact.
 - Having a slender neck.
 - Head being rotated at the moment of impact.
 - Straight and/or kyphotic cervical curvatures prior to collision.

EVALUATION

In the April 15, 1995 issue of the journal Spine (supplemental), the "Scientific Monograph of the Quebec Task Force on Whiplash-associated

Disorders: Redefining 'whiplash' and its Management" was published (10). This multidisciplinary Task Force included a chiropractor, Dr. JD Cassidy. The Quebec Task Force on Whiplash-associated Disorders remains the gold standard in whiplash literature, yet it is now somewhat dated. Published in 1995, the document stopped collecting literature in September of 1993. Even so, aspects of the document are as valid today as they were some 20 years ago, and the classification scheme they proposed has become the global standard.

These (Dr. Davis's) 2014 **Guidelines** emphasized that the whiplash-injured patient should be assigned a Quebec Task Force grade:

- 0 No neck pain or stiffness or any physical signs are noticed.
- I Neck pain, stiffness or tenderness, but no physical signs are noted by the examining health care provider.
- II Neck complaints and the examining health care provider finds decreased range of motion and point tenderness in the neck.
- III Neck complaints plus neurological signs such as decreased deep tendon reflexes, weakness and sensory deficits.
- IV Neck complaints and fracture or dislocation, or injury to the spinal cord. These patients require a referral to an emergency medical specialists.

A very important and rarely understood aspect of the Quebec Task Force on Whiplash-associated Disorders is that in any category, including Grade 0 (no neck pain or stiffness or any physical signs noticed), the patient can still have any of these symptoms:

Deafness
Dizziness
Tinnitus (ringing in the ears)
Headache
Memory loss
Dysphagia (difficulty swallowing)
Temporomandibular joint pain

Patients should be **assessed and reassessed** at these intervals:

- Initial Assessment
- Seven-Day Reassessment

- Three-Week Reassessment
- Six-Week Reassessment
- Three-Month Reassessment

It is suggested that at these **Assessments/Reassessments** that the following measurement outcomes should be used:

- Visual Analogue Scale (VAS) or Numeric Pain Score (NPS)
- Neck Disability Index (NDI)
- Short Form-36 (SF-36)

Patient History Documentation should include:

- Symptoms caused by the accident
 - Symptoms quality and character
 - Symptom duration, intensity, frequency, location and radiation
 - Symptom aggravating and/or relieving factors.
- Relevant family history
- Past health history (general health, prior illness, injuries, hospitalizations, medications, surgical history)
- Mechanism of the injury
- Prior interventions, treatments, medications

The **Treatment Plan** should be documented:

- Recommended duration and frequency of treatment
- Specific treatment goals

Subsequent Visit Documentation should include:

- Review of chief complaint
- Assessment of change in patient condition since prior visit
- An Examination of the area of complaint and to be treated
- Evaluation of treatment effectiveness
- Documentation of treatment given on day of visit

The **Physical Examination** should include:

- Postural assessment
- Palpation for tenderness and altered tissue consistencies
- Measured ranges of motion
- Dermatomal superficial sensation
- Myotomal strength
- Subluxation assessment (segmental asymmetries in alignment and/or motion)

- Thoracic Outlet Syndrome tests should be performed in patients with arm complaints and/or findings.

The **Guidelines** refer to another guideline (www.pccrp.org) for radiological assessment. In short, all cervical spine traumatized patients, including whiplash-injured patients, should be evaluated with x-rays. These x-rays include:

- Lateral Cervical Neutral
- Lateral Cervical Flexion (stress view)
- Lateral Cervical Extension (stress view)
- AP Open Mouth
- AP Cervical with Cephalic Tilt
- Left and Right Oblique Views

Other radiographs may be required depending on the uniqueness of a particular case. If range of motion is measurably impaired during the acute phase of injury, the lateral cervical flexion-extension views should be delayed until a more complete range of motion is restored.

The **Guidelines** also covers protocols for MRI, Weight-Bearing MRI, Kinetic MRI, Video Fluoroscopy (VF), CT, SPECT, Discography, Facet Blocks, Surface EMG, Pressure Pain Threshold, Quantitative Sensory Testing, Cerebellar Tonsillar Ectopia (Chiari), Myofascial Pain Syndrome, Thyroid involvement, Mild Traumatic Brain Injury, and Post-Concussive Syndrome.

The Guidelines note that any patient not improving at the Three-Month Reassessment is likely to require a multidisciplinary approach.

RED FLAGS

Red Flags are defined as indicators of serious pathology. Red Flags require immediate investigation by appropriately trained healthcare personnel.

Standard Red Flag cautions apply:

- Infection (fever, etc.)
- Cancer risk (history, unexplained weight loss, pain at rest, etc.)
- Aortic Aneurysm (unexplained persistent back pain, etc.)
- Non-mechanical pain that is unremitting and severe

Specific Whiplash Injury Red Flags would include:

- Bilateral paresthesias in upper and/or lower extremities

- Gait Disturbances
- Spastic Paresis
- Positive Lhermittes sign (shooting pain or paresthesias into the limbs with cervical flexion)
- Deep tendon reflex hyper-reflexia
- Nerve root signs at more than two adjacent spinal levels
- Progressive worsening of neurological signs (motor weakness, sensory loss, areflexia)
- Indicators of long-tract myelopathy (dysfunction in bowels, bladder, sexual function and/or sensation, saddle anesthetics, positive Babinski, etc.)

CRITERIA FOR DISCHARGE

The patient should be discharged from additional regularly scheduled treatment once they have achieved maximum clinical improvement. "Maximum Improvement is achieved when there is no improvement in clinical status for a period of 2 months as assessed with standard measurement outcomes (visual analogue scale, Oswestry Low Back Disability Index, Neck Disability Index, SF-36, etc.)."

"If treatment is withdrawn and the patient's clinical status becomes worse, the patient has not achieved Maximum Medical Improvement."

GRADES OF SEVERITY OF INJURY

Grades of injury severity are important because guidelines for the duration and frequency of treatment are based in part on the grade of injury severity. Four Injury Severity classifications are referenced, and there is overlap between them. These include those for the Quebec Task Force as noted above, and three others:

Norris and Watt, 1983 (11):

- Group 1:** Patients complaining of symptoms related to their injuries but with no abnormality on physical examination.
- Group 2:** Patients who in addition to symptoms had a reduced range of movement of the cervical spine but no abnormal neurological signs.
- Group 3:** Patients with symptoms, a reduced range of cervical movement and evidence of objective neurological loss.

Croft, 1993 (12):

- Grade I:** Minimal: no limitation of motion; no ligamentous injury or neurological findings
- Grade II:** Slight: limitation of motion; no ligamentous injury or neurological findings
- Grade III:** Moderate: limitation of motion; some ligamentous injury; neurological findings may be present
- Grade IV:** Moderate to severe: limitation of motion; ligamentous instability; neurological findings present; fracture or disc derangement
- Grade V:** Severe: requires surgical management/stabilization

Quebec, 1995 (10):

- Grade O:** No complaints about the neck, no physical signs
- Grade I:** Neck complaints of pain, stiffness, or tenderness only;
No physical signs
- Grade II:** Neck complaint AND Musculoskeletal signs (decreased range of motion and point tenderness)
- Grade III:** Neck complaint AND neurological signs (decreased or absent deep tendon reflexes, weakness, and sensory deficits)
- Grade IV:** Neck complaint AND fracture or dislocation

Again, symptoms and disorders that can be manifest in all Quebec grades include deafness, dizziness, tinnitus (ringing in the ears), headache, memory loss, dysphagia (difficulty swallowing), and temporomandibular joint pain.

Sterling, 2004 (13):

- WAD I:** Neck complaint of pain, stiffness or tenderness only
No physical signs
- WAD II A:** Neck pain
Motor Impairment
Decreased ROM

Altered muscle recruitment patterns
Sensory Impairment
Local cervical mechanical hyperalgesia

WAD II B: Same as **WAD II A**, plus:
Psychological impairment
Elevated psychological distress

WAD II C: Same as **WAD II A**, plus **WAD II B**, plus:
Increased JPE (joint position error)
Generalized sensory hypersensitivity
May show Sympathetic Nervous System disturbances
Elevated levels of acute posttraumatic stress

WAD III: Same as **WAD II A**, plus **WAD II B**, plus **WAD II C**, plus:
Neurological signs of conduction loss including:
Decreased or absent deep tendon reflexes
Muscle weakness
Sensory deficits

Dr. Davis proposes a useful amalgamation of these injury severity grades, as follows:

Grades of Severity of Injury
Dr. Davis Guidelines Amalgamation

Grade I Minimal: No limitation of motion; No ligamentous injury;
No neurological findings

Grade II Slight: Limitation of motion; No ligamentous injury;
No neurological findings;
Neck complaint and musculoskeletal signs

Grade III Moderate: Limitation of motion; Some ligamentous injury;
Neurological symptoms
Common symptoms: Neck and arm pain;
Cervical herniated disc; Neck pain with headache;
Cervicoscapulalgia (pain referred to upper back)

Grade IV Moderate to Severe: Limitation of motion; Some ligamentous instability; neurological symptoms; fracture or disc derangement

Grade V Severe: Requires surgical management/stabilization

TREATMENT INTERVENTIONS AND PRINCIPLES OF TREATMENT

In general, treatment principles should include maintaining normal life activities, staying active during the recovery process, and focus on improvements in function. The Guidelines also review the published scientific justification for manual treatment (mobilization, manipulation, adjustment) exercise, modalities (TENS, traction, ultrasound, low-level laser therapy, massage, acupuncture, pulsed electromagnetic fields (PMET), nutrition (including omega-3 essential fatty acid and vitamin D supplementation), kinesio-taping, and education (including postural advice).

Dr. Davis reviews the four stages of injury healing:

- Stage I** Inflammatory phase (acute): Up to 72 hours
- Stage II** Repair phase (subacute): 72 hours to 14 weeks
- Stage III** Remodeling phase: 14 weeks to 12 months or more
- Stage IV** Permanent (chronic phase) learn to live with residuals

Dr. Davis also reviews the practical management of the biology of ligament healing and scar formation, the biology of chronic pain as related to the endogenous pain inhibitory pathways, and the basis for spinal manipulative (adjustment) therapy.

These principles are important for clinical management as well as for the justification for why certain treatment approaches are reasonable and necessary. Such information is invaluable for report writing (required in most cases) as well as for depositions and/or trial testimony (rare requirements for the treating healthcare provider in these cases).

TREATMENT FREQUENCY AND DURATION

The general guidelines for the duration and frequency of treatment is based on the amalgamated grades of severity (page 9 above). Using this classification, duration and frequency guidelines would be:

	Daily	3X/wk	2X/wk	1X/wk	1X/mo	Treatment Duration	Treatment Total Number
Grade I	1 wk	1-2 wk	2-3 wk	<4 wk		<11 wks	<21
Grade II	1 wk	<4 wk	<4 wk	<4 wk	<4 mo	<29 wks	<33
Grade III	1-2 wk	<10 wk	<10 wk	<10 wk	<6 mo	<56 wks	<76
Grade IV	2-3 wk	<16 wk	<12 wk	<20 wk	permanent prn	permanent prn	permanent prn

prn = per required need

Additionally, a number of factors are referenced that may prolong either duration, frequency, of both:

- Pre-existing conditions, including disc/facet degeneration/spondylosis
- Biomechanical stress
- Psychological stress
- Re-injury exacerbation
- Spondylolisthesis
- Advanced age
- Metabolic disorders
- Congenital anomalies of the spine
- Developmental anomalies of the spine
- Disc protrusion (HNP)
- Rheumatoid arthritis; Ankylosing spondylitis
- Scoliosis
- Prior spinal surgery
- Prior vertebral fracture
- Osteoporosis
- Paget's disease or other disease of bone
- Spinal stenosis or foraminal stenosis
- Prior spinal injury

CHRONIC TREATMENT

The **Guidelines** defines chronic whiplash treatment as treatment required after a period of 12 weeks. For these patients, Dr. Davis organizes his thoughts and supportive literature references into these categories:

- The rationale for why continuing spinal manipulations may be beneficial for some patients to maintain improvements in pain and disability levels.

- Cautions and problems with opioid pharmacology use for chronic pain. These include addictions to increased risk of death.
- Cautions and problems associated with nonsteroidal antiinflammatory drugs for patients with chronic pain. These include gastrointestinal bleeding, kidney injury, and increased cardiovascular event risk factors.

Dr. Davis cites 11 references to quantify the number of patients injured in whiplash mechanisms who develop chronic pain syndromes. The cited studies span 40 years of literature. The chronic pain range spans a low of 24% to a high of 90%. The follow-up time range for these studies was between 1-17 years duration.

Dr. Davis lists a number of factors that have been linked to a poor recovery prognosis for whiplash-injured patients:

- High initial pain intensity ($> 7/10$ on the VAS or NPS)
($> 20/50$ on the NDI)
- Radiological cervical kyphosis
- Stress x-ray segmental *hypomobility*
- Stress x-ray segmental *hypermobility*
- Being struck from the rear
- Being caught by surprise on impact
- Having one's head rotated at the moment of impact
- A previous history of neck pain
- A previous history of headache
- Pre-accident degenerative joint disease
- Older age (sadly, $>$ than 50 years of age)
- High number of initial complaints (especially between 4-9)

Dr. Davis cites studies that suggest post-traumatic psychological symptoms are usually caused by chronic somatic pain. Likewise he cites

studies that indicate chronic post-traumatic pain syndromes are not caused by an abnormal psychological profile.

Dr. Davis again stresses, “vehicle damage has not been related to whiplash disorders.”

It is a sad reality that it is inevitable that some patients injured in whiplash mechanisms will develop chronic pain syndrome despite the best efforts of everyone involved. Post-whiplash chronic pain syndromes occur irrespective of a myriad of factors, including mechanistic factors, types of treatment, age, pre-accident degenerative disease, status of litigation, etc. In such individuals, ongoing treatment, including occasional spinal adjusting, serves only to afford the patient a degree of temporary relief of symptoms, often with no long-lasting improvements.

OUTCOME MEASURES

The determination of clinical improvement, maximum improvement, subjective and objective residuals, work status, and ultimate disability status requires the use of measurement outcomes. Some of these have been explored above. The Guidelines for whiplash-injured subjects include the following. The Guidelines provide samples, relevance, scoring protocols, interpretation, and importance for these:

- Visual Analogue Scale (VAS)
- The Numeric Pain Scale (NPS)
- Neck Disability index (NDI)
- Core Whiplash Outcome Measure
- Oswestery Disability Index (ODI), for low back
- Northwick Park Neck Pain Questionnaire
- Pain Disability Questionnaire (PDQ)
- The Short Form 36 Health Questionnaire (SF-36)
- Bournemouth Questionnaire
- Impact of Event Scale (for anxiety and depression)

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