Neck Pain Evidence Summary

The Bone and Joint Decade Task Force on Neck Pain

THE BONE AND JOINT DECADE 2000 - 2010 JOINT MOTION

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The Institute for Work & Health (IWH) created this summary to share the evidence synthesis completed by The Bone and Joint Task Force on Neck Pain.

IWH worked in concert with the Canadian Memorial Chiropractic College, the Ontario Chiropractic Association and some members of the Executive Committee of the Bone and Joint Task Force on Neck Pain to prepare this Neck Pain Evidence Summary.

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Table of Contents

Background: Neck Pain Task Force 4

A New Conceptual Model of Neck Pain 5-7

Neck Pain General Messages 8-10

Neck Pain Treatment Messages 11-14

Grades of Neck Pain

Table 1: Description of Grades (Neck Pain Task Force) 15

Assessing Neck Pain (NPTF)

Figure 1: Assessing Grades of Neck Pain 16

Neck Pain Treatment

Table 2: Non-Invasive Neck Pain Treatments 17-18

Table 3: Invasive Neck Pain Treatments 19-20

Appendices

Appendix A: Whiplash-Associated Disorder (WAD) Clinical Classification System 21

Appendix B: The Canadian C-Spine Rule (CCR) 22

Appendix C: National Emergency X-Radiography Utilization Study (Nexus) 23

Key References 24-25

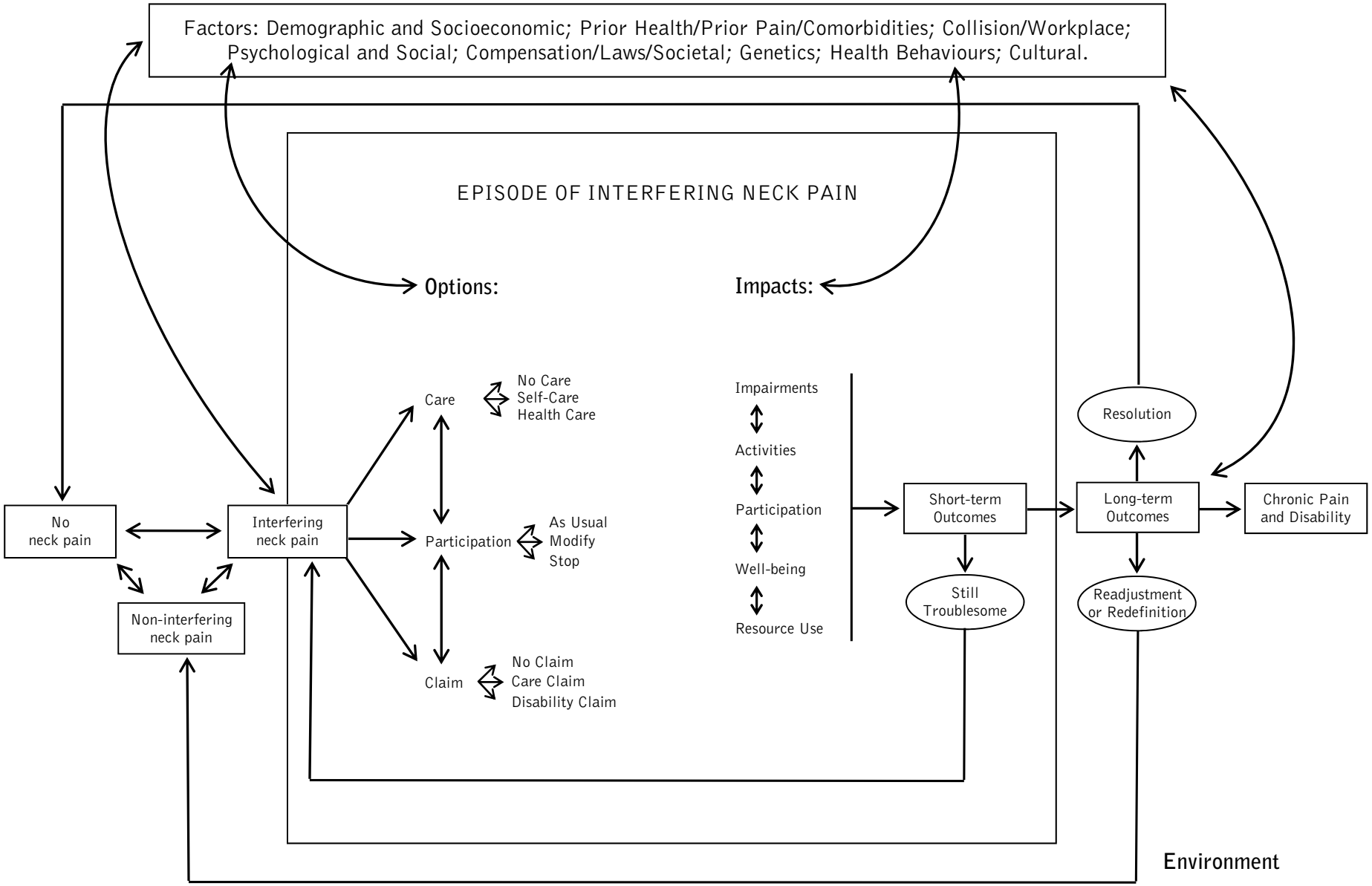
Background: Neck Pain Task Force

Neck pain is common among workers, and has many different causes. While neck pain can't always be cured, there are a variety of treatments. It can include the chronic pain of workers whose jobs can strain their necks, such as lifting done by nurses' aides and construction workers. It results from accidents, such as whiplash in drivers who've been rear-ended. Neck pain also includes tension headaches in anyone who has had a tough day at work. Psychological and social factors also play a role in the onset and course of neck pain. The Neck Pain Task Force created a conceptual model of neck pain which is described in the summary to capture the onset, course and care of neck pain determined by the group.

One challenge is that there hasn't been agreement on which treatments are the most effective. From 1999-2007, an international task force worked to bring some clarity to this and other issues on neck pain. Their work has produced a comprehensive picture of neck pain including its causes, how many workers report it, and how it progresses, based on all the research conducted up until 2008.

The task force was convened in conjunction with the United Nations' initiative to improve the lives of people with musculoskeletal disorders (MSDs), which include neck pain. The UN declared 2000-2010 as the Bone and Joint Decade to focus on this issue. The task force consisted of an Executive Committee, Scientific Secretariat, an Advisory Committee and research associates and graduate students. These groups involved more than 50 people from nine countries and represented 19 clinical and scientific disciplines or specialties. The task force was affiliated with eight collaborating universities and research institutes as well as 11 professional organizations. The task force has published more than 20 research studies and "best evidence" systematic reviews on neck pain. Many of these appear in a supplement to the February 2008 issue of the scientific journal, Spine. While the material in this booklet summarizes the main results from the work of the Neck Pain Task Force, we would encourage you to read the original research articles for more clarification or more information. This summary is not a guideline or regulation. It is important for clinicians to use their well-developed skills, clinical experience and patients' expectations to guide their decision-making.

A New Conceptual Model of Neck Pain



Guzman J, Hurwitz E, Carroll LJ, et al. A new conceptual model of neck pain: linking onset, course, and care: the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine. 2008; 33 (4 Suppl): S14-S23.

A New Conceptual Model of Neck Pain

The Neck Pain Task force developed a new model of neck pain for two purposes:

1. To provide a model to integrate the cause of neck pain with its management.
2. To help organize and interpret existing knowledge and to highlight the gaps in current literature.

The model is built on six premises:

1. The primary perspective of interest is that of people with neck pain or who are at risk of developing neck pain.

- The overarching goal of the Neck Pain Task Force is to help reduce the personal and societal burden of neck pain and to empower people with neck pain to make their own decisions.
- The model focuses on the transitions in neck pain experienced by a person over a lifetime and the options available for dealing with neck pain.

2. The course of neck pain is best described as episodes occurring over a lifetime with variable degrees of recovery in between episodes.

- This premise is consistent with the mounting evidence about the episodic course of other musculoskeletal symptoms.
- Previous views, less supported by research, saw neck pain as a single event with permanent resolution.

A New Conceptual Model of Neck Pain

3. The onset and course of neck pain are affected by multiple factors.

- As a general rule, many environmental and personal factors combine to cause neck pain and to influence its course.
- These factors are demographic, socioeconomic, psychological, social, legal/societal and cultural, and include prior health, prior pain, co-morbidities, collision/workplace, compensation, genetics and health behaviours.

4. The management and subsequent course of neck pain depend on the options available at the time and on how these options are appraised.

- The options available to people with neck pain are primarily determined by personal, cultural and societal factors. In some instances, the options are so restricted that the person really has few choices.

5. The impact of neck pain on the person can be described in various ways.

- These include changes to body structures and functions, tasks the person can accomplish, involvement in life situations, subjective well-being and resource utilization.

6. Linkages between factors and impacts can occur in multiple directions.

- Any given factor could impact the onset, course or outcomes of neck pain, and a short-term outcome could impact subsequent factors and long-term outcomes.

Neck Pain General Messages

1. Neck pain is a widespread experience.

- Most people suffering from neck pain manage to carry on with their usual activities.
- Neck pain that limits activity occurs in 2 to 11 per cent of the general adult population per year.
- One or two in 20 people will find their neck pain disabling.

2. Once an episode of neck pain occurs, many people will find it is a persistent or recurrent condition.

- Neck pain can fluctuate from mild to severe pain

3. There is usually no single cause of neck pain.

- There are usually multiple factors that contribute to an individual's neck pain, including overall physical and mental health, work and daily activities.
- Most neck pain is not the result of serious injury or disease.
- Diagnostic tests such as X-rays, Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) scans are only required in a minority of cases when a thorough physical examination and patient history indicate further investigation is needed. Routine imaging will not increase the understanding of what caused the pain.

Neck Pain General Messages

4. Neck pain, including whiplash-associated disorders,* should be classified into a new common system. The Neck Pain Task Force recommends four grades (see Table 1 for more details).

- Grade I: Neck pain with little or no interference with daily activities.
- Grade II: Neck pain that limits daily activities.
- Grade III: Neck pain accompanied by radiculopathy (also known as "pinched nerve," involving pain, weakness and/or numbness in the arm).
- Grade IV: Neck pain with serious pathology, such as tumour, fracture, infection or systemic disease. It was beyond the mandate of the task force to study Grade IV neck pain.

* A classification system for whiplash-associated disorders is in place in guidelines and legislation in some provinces in Canada (See Appendix A).

5. Use of Imaging

- Among patients with a traumatic acute neck injury, the Canadian Cervical Spine Rule (CCR) or the National Emergency X-Radiography Utilization Study (NEXUS) Low Risk Criteria are extremely effective at identifying patients who do not require imaging (See Appendices B and C).
- Five-view X-rays are no more effective than three views in indentifying fractures.
- CT scans are more sensitive in acute fractures than X-rays in high-risk patients e.g. those who are intoxicated or unconscious.

Neck Pain General Messages

6. **The risk of vertebrobasilar (VBA) stroke following a visit to a chiropractor's office appears to be no different from the risk of stroke following a visit to an MD's office.**

- It is likely that patients in the early stages of VBA stroke are presenting to both chiropractors and family doctors because of neck pain and headache due to pre-existing vertebral artery dissection, which is a risk factor for VBA stroke.
- VBA dissection and stroke is extremely rare and there is no practical way to screen neck pain and headache patients for this problem.

Neck Pain Treatment Messages

1. There is no "best" treatment for neck pain that is effective for everyone.

- Trying a variety of therapies that are likely helpful, or combinations of treatments, may be needed to provide relief.
- Treatment benefits are often modest and short-lived.
- Be cautious of treatments that make "big" claims for relief of neck pain.
- Short episodes of care may be helpful. Lengthy treatment is not associated with greater improvements.
- Treat based on patient's grade of neck pain.

2. Treatments should be based on the patient's informed treatment preferences and attitudes toward risk.

- Provide the patient with an informed choice of effective treatment options and involve the patient in decision-making/trials of different options.

Neck Pain Treatment Messages

3. Most neck pain can be classified as Grade I or II. A variety of treatments are likely helpful (see Table 2 for more details). No one effective treatment is superior to any others.

a) Effective treatments for non-traumatic neck pain:

- Manipulation
- Mobilization
- Supervised exercises
- Manual therapy plus exercise
- Acupuncture
- Low level laser therapy
- Analgesics

b) Effective treatments for acute traumatic neck pain:

- Educational video
- Mobilization
- Exercises
- Mobilization plus exercise

Neck Pain Treatment Messages

4. Several treatments are likely *not* helpful for Grades I or II neck pain (see Table 2 for more details).

a) Non-effective treatment for non-traumatic neck pain:

- Advice from health-care providers on its own
- Collars
- Passive modalities (heat therapy, ultrasound, Transcutaneous Electrical Nerve Stimulation (TENS), electrical muscle stimulation)
- Exercise instruction
- Botulinum toxin A.

b) Non-effective treatments for acute traumatic neck pain:

- Pamphlet/neck booklet alone
- Passive treatments (heat, cold, diathermy, hydrotherapy, ultrasound TENS)
- Referral to fitness or rehabilitation program
- Frequent early health-care service
- Methylprednisolone
- Exercise instruction
- Botulinum toxin A
- Corticosteroid injections

c) Non-effective treatments for non-acute neck pain:

- Passive treatments (heat, cold, diathermy, hydrotherapy, ultrasound, TENS)
- Corticosteroid injections

Neck Pain Treatment Messages

5. Proceed cautiously when treating Grade III neck pain.

- There is little research on non-surgical interventions for Grade III neck pain.
- Consider epidural corticosteroid injections for temporary relief of radiculopathy.
- Consider surgery in the presence of serious pathology or persistent radiculopathy.

Grades of Neck Pain

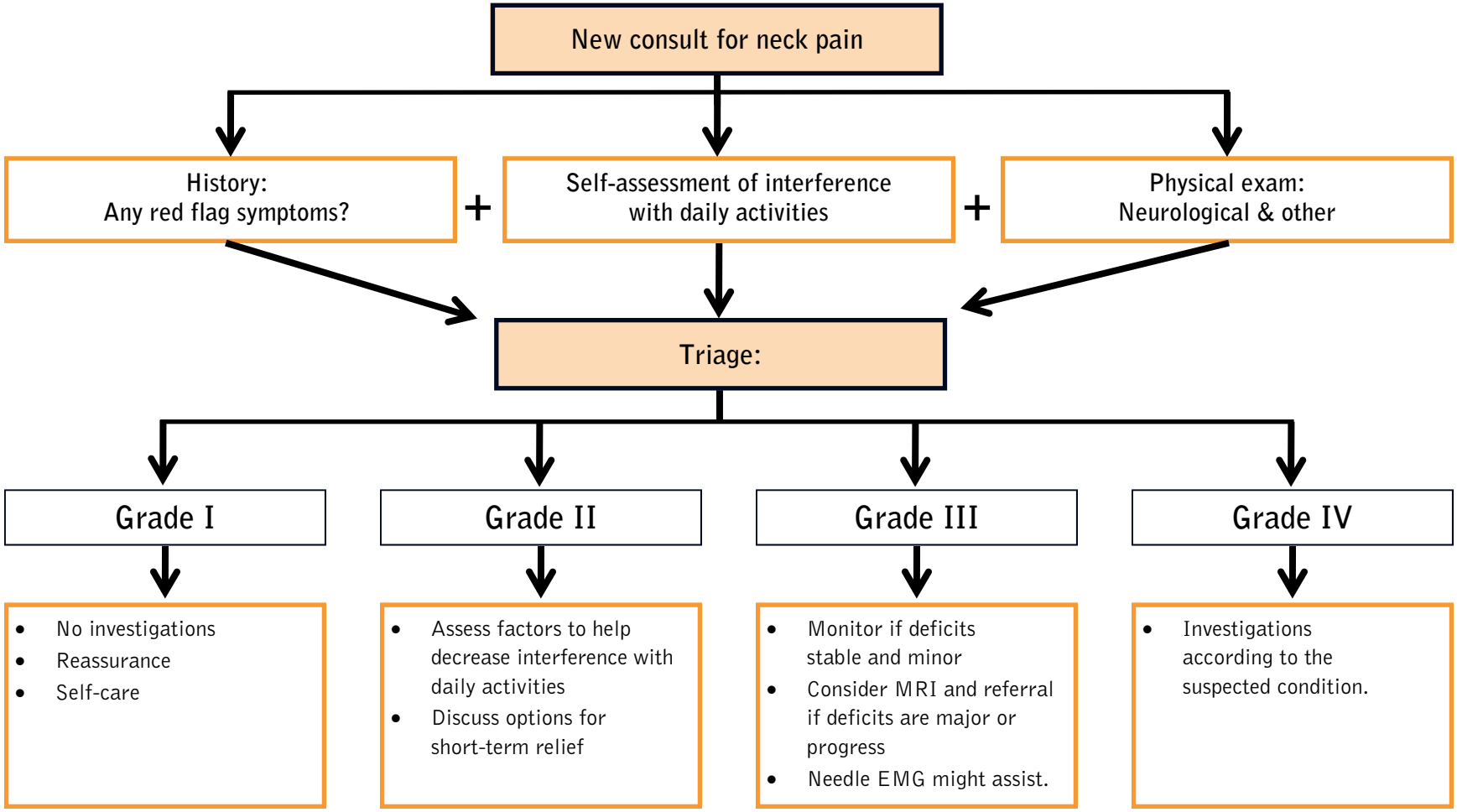
Table 1: Description of grades (Neck Pain Task Force)

Description	Symptoms/signs	Initial assessment
Grade I No signs of major pathology and no or little interference with daily activities.	• stiffness, tenderness, but no significant neurological complaints • no signs and symptoms of major structural pathology (e.g. fracture, dislocation, infection, etc)	• does not require further imaging or laboratory investigation • reassure patient that serious injury is very unlikely • encourage patients to remain as active as possible and avoid neck immobilization • important to assess prognostic factors
Grade II No signs of major pathology, but interference with daily activities.	• neck pain interference with daily activities • no signs and symptoms of major structural pathology or root compression	• does not require imaging or laboratory investigation • reassure patient that serious structural injury is very unlikely • should be reassessed as needed • important to assess prognostic factors
Grade III Neck pain with neurological signs or symptoms	• complaints of neck pain associated with significant neurologic signs (e.g. decreased deep tendon reflexes, weakness, sensory deficits) • these complaints suggest malfunction of spinal nerves or the spinal cord	• requires closer monitoring to detect any progression of neurologic signs, and should be followed up by primary care clinicians or a specialist • provocation tests can be used to rule out radiculopathy • those with severe incapacitating radicular pain, major neurologic deficits at onset, or progression of deficits should be considered for CT or MRI imaging and referral for a specialty opinion • needle electromyography may be of value in confirming the presence of radiculopathy
Grade IV Neck pain with signs of major pathology	• complaints of neck pain and/or its associated disorders along with signs or symptoms of major structural pathology, detected by clinician • be aware of red flags for fractures, myelopathy, infection, neoplasm, other destructive lesions or systemic diseases	• should undergo expedient investigation tailored to the suspected condition • no single test will be indicated in all circumstances, but radiographs, MRI, bone scan and inflammatory markers in blood might be considered • if initial testing does not rule out major pathology, referral might be indicated

Guzman J, Haldeman S, Carroll LJ, Carragee EJ, Hurwitz EL, Peloso P et al. Clinical practice implications of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders: from concepts and findings to recommendations. Spine. 2008; 33[4S]: S199-S213.

Assessing Neck Pain (NPTF)

Figure 1: Assessing grades of neck pain



Options for short-term relief

Likely helpful for neck pain after a traffic collision: exercise training and mobilization
Likely helpful for neck pain with no trauma: exercise training, mobilization, manipulation, acupuncture, analgesics, low-level laser

Modified version of: Guzman J, Haldeman S, Carroll LJ, Carragee EJ, Hurwitz EL, Peloso P et al. Clinical practice implications of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders: from concepts and findings to recommendations. Spine. 2008; 33[4S]: S199-S213.

Neck pain treatment

Table 2: Non-invasive neck pain treatment

Grade of neck pain and scenario	Likely helpful	Possibly helpful	Likely not helpful	Not enough evidence *
Grade I and II (acute) traumatic neck pain	Educational video, mobilization, exercises, mobilization plus exercises	Pulsed electromagnetic therapy	Pamphlet/neck booklet alone, passive modalities (heat, cold, diathermy, hydrotherapy), referral to fitness or rehab program, frequent early health-care service, methylprednisolone, passive modalities (ultrasound, TENS), exercise instruction, botulinum toxin A	Manipulation, traction, non-steroidal anti-inflammatory drugs (NSAIDS), other drugs
Grade I and II (non-acute) traumatic neck pain		Supervised exercises, coordinated multidisciplinary care	Passive modalities (TENS, ultrasound), corticosteroid injections	Manipulation, traction, NSAIDs, other drugs
Grade I and II non-traumatic neck pain	Manipulation, mobilization, supervised exercises, manual therapy (manipulation, mobilization, massage) plus exercises, acupuncture, low-level laser therapy, analgesics	Percutaneous neuromuscular therapy, brief intervention using cognitive behavioural principles	Advice alone, collars, passive modalities (heat therapy, ultrasound, TENS, electrical muscle stimulation), exercise instruction, botulinum toxin A	Magnetic stimulation, massage alone, traction, NSAIDS, other drugs
Grade III (suspected cervical radiculopathy)				All interventions

Neck pain treatment

Table 2: Non-invasive neck pain treatment

Grade of neck pain and scenario	Likely helpful	Possibly helpful	Likely not helpful	Not enough evidence *
Cervicogenic headache		Manipulation, mobilization, supervised exercises, manipulation or mobilization plus supervised exercises, water pillow		Passive modalities, traction, NSAIDS, other drugs
Neck pain in workers		Supervised exercises plus strength or endurance training and/or relaxation training with behavioral support	Ergonomic interventions, forced work breaks, rehabilitation programs, stress management programs, relaxation training, physical training, exercise instruction	

Note: The scenarios above are presented separately as they were not classified in the grade system.

*More research is needed to understand the impact of these treatments and greater clinical judgment should be used if considering these options.

Modified version of: Hurwitz EL, Carragee EJ, van der Velde G, Carroll LJ, Nordin M, Guzman J et al. Treatment of neck pain: noninvasive interventions: results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders. *Spine.* 2008; 33[4S]: S123-S152.

Neck pain treatment

Table 3: Invasive neck pain treatment

Grade of neck pain and scenario	Likely helpful	Possibly helpful	Likely not helpful	Not enough evidence *
Grades I and II			Corticosteroid injections to cervical facets	Radio frequency (RF) neurotomy to cervical facets nerves, cervical decompression, anterior cervical fusion, cervical disc replacement
Grade III neck pain with radiculopathy	Discectomy or discectomy with fusion	Trial of a corticosteroid for short-term relief. Discectomy with fusion and instrumentation. Cervical disc replacement (long-term efficacy and safety are unknown)	Heating of the dorsal, root ganglion	
Grade IV major structural pathology	Beyond the task force mandate. Aggressive surgical treatment of many of these conditions is generally accepted as effective and often strongly advised. Readers should refer to literature of specific pathological conditions.			

Neck pain treatment

Table 3: Invasive neck pain treatment

Grade of neck pain and scenario	Likely helpful	Possibly helpful	Likely not helpful	Not enough evidence *
Cervicogenic headache without serious underlying structural pathology				Radio frequency (RF) neurotomy to cervical facets nerves, corticosteroid injections to cervical facets or nerves, cervical decompression, anterior cervical fusion, cervical disc replacement

Note: The scenario above is presented separately as it was not classified in the grade system.

*More research is needed to understand the impact of this treatment and greater clinical judgment should be used if considering this option.

Modified version of: Carragee EJ, Hurwitz EL, Cheng I, Carroll LJ, Nordin M, Guzman J et al. Treatment of neck pain: injections and surgical interventions: results of the bone and joint decade 2000-2010 task force on neck pain and its associated disorders. Spine. 2008; 33[4S]: S153-S169.

Appendices

Appendix A

Whiplash Associated Disorder (WAD) Clinical Classification System

Grade 0	no neck pain complaints and no physical signs
Grade I	injuries involving complaints of neck pain, stiffness or tenderness, but no physical signs
Grade II	neck complaints accompanied by decreased range of motion and point tenderness (musculoskeletal signs)
Grade III	neck complaints accompanied by neurologic signs such as decreased or absent deep tendon reflexes, weakness and/or sensory deficits
Grade IV	injuries in which neck complaints are accompanied by fracture or dislocation

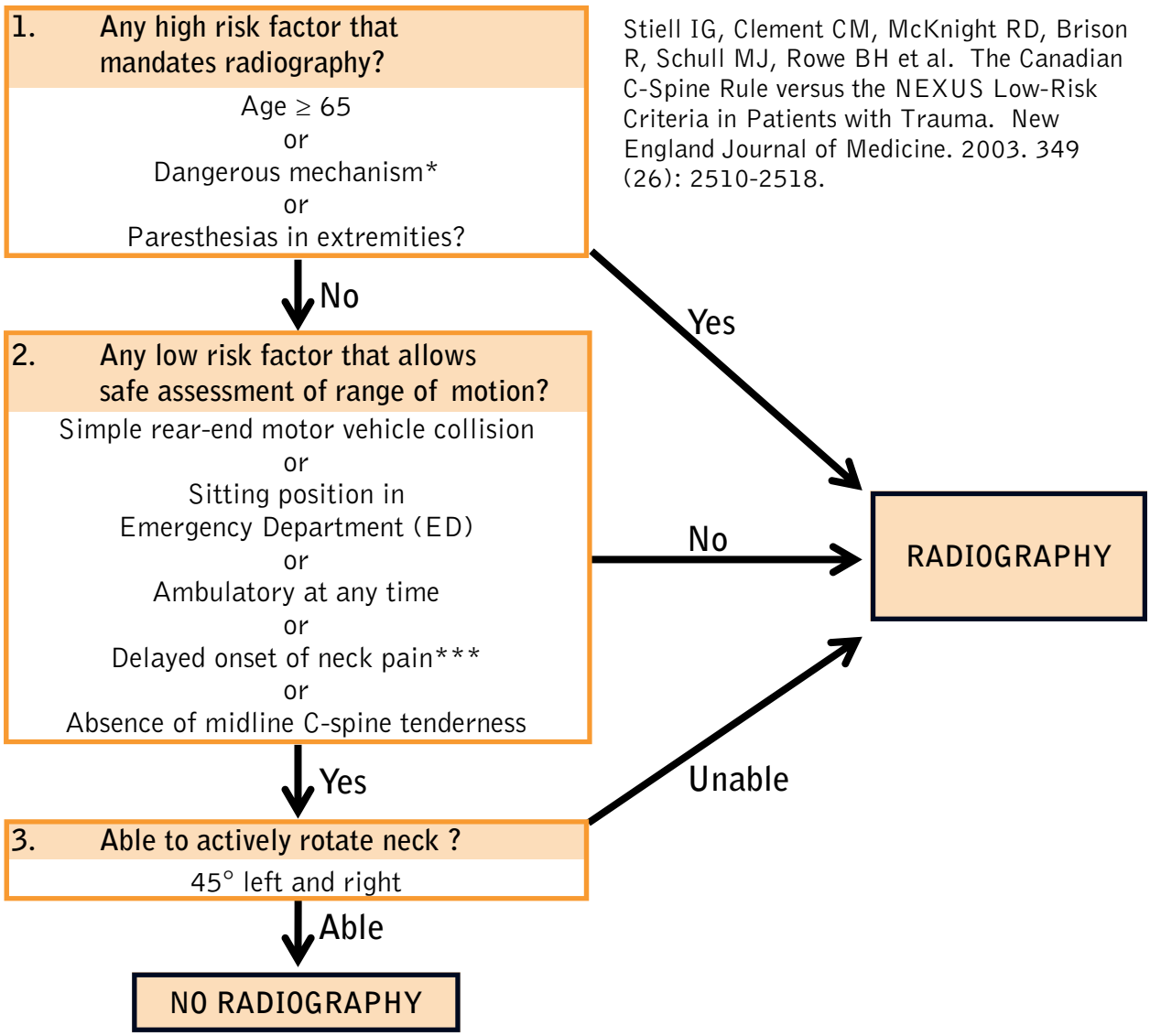
Note: other symptoms such as deafness, dizziness, tinnitus, headache, memory loss, dysphagia and temporomandibular joint pain can be present in all grades.

Spitzer WO, Skovron ML, Salmi LR, et al. Scientific monograph of the Quebec task force on whiplash-associated disorders: redefining "whip-lash" and its management. Spine. 1995; 20, S1-S73.

Appendix B

The Canadian C-Spine Rule (CCR)

Among patients with a traumatic acute neck injury, CCR is effective at identifying those who do not require imaging.



Stiell IG, Clement CM, McKnight RD, Brison R, Schull MJ, Rowe BH et al. The Canadian C-Spine Rule versus the NEXUS Low-Risk Criteria in Patients with Trauma. New England Journal of Medicine. 2003. 349 (26): 2510-2518.

* *Dangerous mechanism*
- fall from elevation ≥ 3 feet/5 stairs
- axial load to head, i.e. diving
- MVC high speed (> 100 km/hr), rollover, ejection
- motorized recreational vehicles
- bicycle struck or collision

** *Simple rear end motor vehicle collision (MVC) excludes*
- being pushed into oncoming traffic
- being hit by bus/large truck
- being hit by high speed vehicle
- a rollover

*** *Delayed*
- i.e. no immediate onset of neck pain

Appendix C

National Emergency X-Radiography Utilization Study (NEXUS)

Among patients with a traumatic acute neck injury, NEXUS is effective at identifying those who do not require imaging. Similar to the Canadian C-Spine rule, the NEXUS is used to reduce the rate of unnecessary cervical spine radiography and safely identify patients who do not require radiography.

Below is the NEXUS low-risk criteria algorithm for screening neck injuries. If patients have none of the symptoms below, radiography would not be necessary and would not be of benefit.

1. **No posterior midline cervical spine tenderness** - this condition is present if the patient reports pain on palpation of the posterior midline neck from the nuchal ridge to the prominence of the first thoracic vertebrae, or if the patient evinces pain with direct palpation of any cervical spinous process.

2. **No evidence of intoxication** - patients should be considered intoxicated if they have: a recent history provided by the patient or observer of intoxication or intoxicating indigestion; evidence of intoxication on physical examination such as an odour of alcohol, slurred speech, ataxia, dysmetria, or other cerebella findings, or any behaviour consistent with intoxication. Patients may also be considered intoxicated if tests of bodily secretions are positive for alcohol or drugs that affect level of alertness.

3. **A normal level of alertness** - an altered level of alertness can include the following: a Glasgow Coma Scale score of 14 or less; disorientation to person, place, time or events; an inability to remember three objects at five minutes; a delayed or inappropriate response to external stimuli or other findings.

4. **No focal neurological deficit** - this deficit is any focal neurological finding on motor or sensory examination.

5. **No painful distracting injuries** - no precise definition of painful distracting injury is possible. This category includes any condition thought by the clinician to be producing pain sufficient to distract the patient from a second (neck) injury. Physicians may also classify any injury as distracting if it is thought to have the potential to impair the patient's ability to appreciate other injuries. Such injuries may include but are not limited to, any long-bone fracture, a visceral injury requiring surgical consultation, a large laceration, degloving injury, crush injury, large burns or any other injury causing acute functional impairment.

Hoffman JR, Schriger DL, Mower W, et al. Low-risk criteria for cervical spine radiography in blunt trauma: a prospective study. Annals of Emergency Medicine. 1992; 21:1454-1460.

Key References

All articles by the Neck Pain Task Force can be found in this supplement:

Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders [Supplement to February 15, 2008]. Spine. 2008; 33(4 Suppl).

References to articles on specific topics are identified below:

Treatment/clinical practice articles:

Carragee EJ, Hurwitz EL, Cheng I, Carroll LJ, Nordin M, Guzman J, et al. Treatment of neck pain: injections and surgical interventions: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine. 2008; 33(4 Suppl): S153-S169.

Cassidy JD, Boyle E, Côté P, He Y, Hogg-Johnson S, Silver FL, Bondy SJ, et al. Risk of vertebrobasilar stroke and chiropractic care, results of a population-based case-control and case-crossover study: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine. 2008; 17 (Suppl 1): S176-S183

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Hurwitz EL, Carragee EJ, van der Velde G, Carroll LJ, Nordin M, Guzman J et al. Treatment of neck pain: noninvasive interventions: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine. 2008; 33(4 Suppl): S123-S152.

Van der Velde G, Hogg-Johnson S, Bayoumi AM, et al. Identifying the best treatment among common nonsurgical neck pain treatments: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders . Spine. 2008;33 (Suppl): S184:191.

Risk factors, course and burden articles:

Carroll LJ , Hogg-Johnson S, van der Velde G, et al. Course and prognostic factors for neck pain in the general population: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine. 2008; 33 (4 Suppl): S75-S82.

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Hogg-Johnson S, van der Velde G, Carroll LJ, et al. The burden and determinants of neck pain in the general population: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. Spine. 2008; 33 (4 Suppl): S39-S51.

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Cassidy JD. Mobilisation or immobilisation for cervical radiculopathy? Let the patient decide. British Medical Journal. 2009; 339: 927-928.

Hoffman JR, Schriger DL, Mower W, et al. Low-risk criteria for cervical spine radiography in blunt trauma: a prospective study. Annals of Emergency Medicine. 1992; 21:1454-1460.

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Stiell IG, Clement CM, McKnight RD, Brison R, Schull MJ, Rowe BH, et al. The Canadian C-Spine Rule versus the NEXUS Low-Risk Criteria in Patients with Trauma. New England Journal of Medicine. 2003. 349(26): 2510-2518.