

CERVICAL MANIPULATION CLINICAL PRACTICE GUIDELINES

SUMMARY OF RECOMMENDATIONS

Purpose: To create a document of clinical practice guidelines for physical therapists in The Ohio State University network to utilize and reference when establishing patient safety and appropriateness for cervical manipulation based on the most recent literature recommendations.

<p>Proposed Benefits</p>	<ol style="list-style-type: none"> 1. Mechanical <ul style="list-style-type: none"> • Increase joint space, improve range of motion, improve biomechanics, decrease soft tissue tone 2. Neurophysiological <ul style="list-style-type: none"> • Modulate nerve activity in afferent fibers, alter sympathetic activity, elicit hypoalgesic response, increase descending inhibition mechanisms 3. Psychological <ul style="list-style-type: none"> • Patients with a high positive expectation of success regarding manual therapy may obtain psychological benefits 						
<p>Contraindications and Precautions</p>	<ol style="list-style-type: none"> 1. Contraindications <ul style="list-style-type: none"> • Worsening neurological function • Upper motor neuron lesion • Spinal cord damage • Multi-level nerve root pathology • Unremitting night pain • Relevant recent trauma • Unremitting, severe non-mechanical pain • Patient refuses to give consent • Evidence of suspected cervical artery dissection 2. Precautions <ul style="list-style-type: none"> • Hypermobility syndromes • Local infections • Osteoporosis/Osteopenia • Active or history of cancer • Age > 55 years old • Long-term corticosteroid use • Inflammatory disease • High fear avoidance behaviors 						
<p>Indications</p>	<div style="border: 1px solid black; padding: 10px; text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 10px;">Cervicogenic headache</td> <td style="width: 50%; padding: 10px;">Positive flexion-rotation test</td> </tr> <tr> <td colspan="2" style="padding: 10px;">Possible Indications</td> </tr> <tr> <td style="width: 50%; padding: 10px;">Cervical hypomobility with reproduction of concordant symptoms</td> <td style="width: 50%; padding: 10px;">Neck pain with radiating symptoms in non-acute phase</td> </tr> </table> </div>	Cervicogenic headache	Positive flexion-rotation test	Possible Indications		Cervical hypomobility with reproduction of concordant symptoms	Neck pain with radiating symptoms in non-acute phase
Cervicogenic headache	Positive flexion-rotation test						
Possible Indications							
Cervical hypomobility with reproduction of concordant symptoms	Neck pain with radiating symptoms in non-acute phase						

Clinical Prediction Rule

1. See Appendix A for updated level of evidence from 2017 JOSPT neck pain clinical practice guideline for cervical and thoracic mobilization/manipulation
2. **Cervical Manipulation Clinical Prediction Rule: Puentedura, et al. JOSPT 2012**
 1. Symptom duration <38 days
 2. Side-to-side difference in cervical rotation >10 degrees
 3. Positive expectation manipulation will be beneficial
 4. Pain with P-A spring testing of middle cervical spine

Stage of CPR Development: Derivation

Variables	Sensitivity	Specificity	LR+	Prob of Success
3	0.81	0.94	13.50	90%
4	0.50	1.00	Infinite	100%

Examination Testing and Screening

Subjective Questioning

1. Mechanism of Injury
 - Most likely cause of cervical vascular compromise is a history of minor mechanical trauma
2. Screening Questions
 - Dizziness, Dysphagia, Diplopia, Dysarthria, Drop attacks, Numbness, Nausea, Nystagmus (5 D's and 3 N's)
 - Thomas *et al*: 66% of individuals experienced one of these transient ischemic features in the month prior to diagnosis of dissection. This indicates a portion of individuals will not present with these symptoms even if a dissection is present
3. Myelopathy Screening Questions
 - Numbness/tingling/weakness bilaterally or in all four limbs
 - Difficulty walking
 - Difficulty with fine motor skills
 - Change in bowel or bladder
4. General Health Questions
 - Yearly physician follow-ups / Current medications
 - Smoking History
 - Corticosteroid Use
 - High Blood Pressure

Objective Measures

1. Blood Pressure
 - Hypertension is predictor of cardiovascular disease and is a risk factor for carotid or vertebral artery disease, but must be analyzed in context of other findings
 - See Appendix B for updated 2017 AHA blood pressure guidelines
2. Palpation of Carotid Artery
 - Only necessary if abnormal subjective symptoms or abnormal BP is present
3. Neurological Exam
 - Cranial nerve exam
 - Upper motor neuron testing



	<ul style="list-style-type: none"> • Muscle stretch reflexes • Sensory exam <ol style="list-style-type: none"> 4. Canadian C-Spine Rules <ul style="list-style-type: none"> • Sensitivity of 0.90-1.00 in identifying individuals with cervical spine fractures • See appendix C for specific guidelines 5. Craniovertebral Ligament Testing <ul style="list-style-type: none"> • Current evidence on predictive ability of these tests is poor, so the PT must consider whether this testing is prudent or safe when subjective symptoms of instability are present 6. Vertebral Artery Test <ul style="list-style-type: none"> • Numerous studies have brought into question the validity of the vertebral artery insufficiency (VAI) test • Results of the test must be taken into context of all clinical examination findings 7. Cervical Examination <ul style="list-style-type: none"> • Range of motion • Passive accessory joint mobility • Flexion rotation test
Patient-Reported Outcome Measures	<ol style="list-style-type: none"> 1. Fear-Avoidance Belief Questionnaire (FABQ) <ul style="list-style-type: none"> • Scoring <19 on FABQ-work subscale is included in the lumbar manipulation CPR • Puentedura et al. include “positive expectation that manipulation will be beneficial” in the 2012 cervical manipulation clinical prediction rule • This may indicate a higher positive expectation and/or lower level of fear-avoidance may increase likelihood of success with cervical manipulation 2. Neck Disability Index (NDI) <ul style="list-style-type: none"> • Tseng et al. identified six predictors of success for cervical manipulation, one being “initial score on NDI < 11.50”
Prior to Performing Cervical Manipulation	<ol style="list-style-type: none"> 1. Informed Consent <ul style="list-style-type: none"> • Obtain express consent in written or verbal form • Record in a standardized manner in patient’s clinical record 2. Positional Testing <ul style="list-style-type: none"> • Sustained pre-manipulative hold must be performed to assess patient response <ul style="list-style-type: none"> ○ Hold position for 10 seconds ○ Instruct patient to keep eyes open during the hold ○ Patient’s eyes should be in therapist’s view to assess for nystagmus • Only perform manipulation if patient has appropriate response

Risks of Spinal Manipulation – How Safe Is It Actually?

By the Numbers	<ol style="list-style-type: none"> 1. Risk of vertebral artery insufficiency event estimated at roughly 6 in 10 million 2. Thiel, et al: Risk of any serious adverse event is at-worst 1 in 10,000 3. Puentedura, et al: Analyzed 134 cases of adverse events following cervical manipulation and estimated that roughly half could have been prevented with proper screening
Mechanical vs. Vascular Pain	<ol style="list-style-type: none"> 1. Most common cause of vascular-related referred pain is hx of minor mechanical trauma 2. Commonly presents as ipsilateral headache and neck pain 3. Monitor patient for transient ischemic features (5 D's and 3 N's) and refer to ER for angiogram if suspecting vascular involvement
Does Age Matter?	<ol style="list-style-type: none"> 1. Age > 55 years old is a “precaution” due to increased prevalence of spondylosis 2. Over 90% of individuals > 70 years old estimated to have some form of asymptomatic degenerative spine changes 3. Sound clinical reasoning must be utilized and documented when considering a manipulation in this patient population
Upper Cervical vs. Mid-Cervical Manipulation	<ol style="list-style-type: none"> 1. Specific comparative risk not established in the literature 2. Extreme ranges of cervical rotation elicit the greatest amount of stress on vertebral artery 3. Upper cervical rotation, mainly coming from the atlantoaxial joint, has been shown to place more stress on the vertebral artery than overall cervical rotation 4. It may be prudent for therapists to try and avoid end-range upper cervical rotation when performing cervical manipulations <div data-bbox="1230 793 1511 1077" style="text-align: right;"> </div> <p data-bbox="505 1108 899 1129" style="text-align: center;"> https://sciencebasedmedicine.org/category/chiropractic/ </p>
Positioning	<ol style="list-style-type: none"> 1. Maximal cervical extension and rotation combined provide the greatest strain on the vertebral artery 2. Evidence suggests the strain on vertebral arteries during manipulation is similar to that of the strain during general ROM testing 3. Positioning of the neck may be more significant than the actual thrust manipulation when determining risk
Can we ever be 100% sure?	<ol style="list-style-type: none"> 1. There seems to be no compelling evidence that clinical examination findings or even results of an ultrasonography can identify patients at risk for VBI, so thorough clinical reasoning and shared decision-making with the patient must always be utilized by the therapist
Documentation	<ol style="list-style-type: none"> 1. When documenting a cervical manipulation, must include: <ul style="list-style-type: none"> • Consent obtained • Technique used • Set up / Utilization of pre-manipulative hold • Grade • Patient response
Patient Response	<ol style="list-style-type: none"> 1. Estimated that 20-45% of patients can expect minor to moderate adverse events following manual therapy intervention, with 50% of those resolving within 48 hours. 2. Common minor to moderate symptoms <ul style="list-style-type: none"> • Worsening of neck/shoulder pain • Dizziness • Light-headedness



3. Onset of severe headache, severe neck pain, slurred speech or onset of paralysis or numbness could indicate possible artery dissection
 - If these symptoms occur and persist, the therapist must monitor the patient closely and ensure they receive emergency care immediately

Literature Review on Overall Effectiveness

Manipulation vs. Mobilization	<ol style="list-style-type: none"> 1. Gross <i>et al</i> 2004 systematic review determined there is currently not sufficient research indicating the superiority of either mode of treatment 2. Gross <i>et al</i> updated 2015 systematic review provided following conclusions: <ul style="list-style-type: none"> • Multiple sessions of cervical manipulation produced similar changes in pain, function, QOL, global perceived effect and patient satisfaction when compared to multiple sessions of cervical mobilizations at all follow-up time frames • For acute and sub-acute neck pain, multiple sessions of cervical manipulation may be more beneficial in improving pain and function than some medications • For sub-acute and chronic neck pain, cervical mobilization alone may not be different from ultrasound, TENS, acupuncture, or massage
Manipulation vs. Exercise	<ol style="list-style-type: none"> 1. Gross <i>et al</i>: Strong evidence to support use of multi-modal treatment consisting of cervical mobilization and/or manipulation plus exercise when compared to wait-and-see approach 2. Hoving <i>et al</i>: Patients with nonspecific neck pain > 2 weeks in duration <ul style="list-style-type: none"> • Manual therapy-only group showed significantly better outcomes than exercise-only group and group who continued with their primary practitioner
Cervicogenic Headaches	<ol style="list-style-type: none"> 1. Gross <i>et al</i>: For chronic CGH, multiple sessions of cervical manipulation may be more effective than massage and TENS in pain reduction at immediate and short-term follow-up 2. Dunning <i>et al</i>: Upper cervical manipulation and upper thoracic manipulation group showed significantly greater reduction in headache intensity and disability at 3-month follow-up than mobilization + exercise group
Thoracic Manipulation	<ol style="list-style-type: none"> 1. Gross <i>et al</i>: Thoracic manipulation significantly reduced pain in patients with acute and sub-acute neck pain 2. B level evidence in 2017 Neck Pain CPG for variety of neck conditions (see Appendix A) 3. Usually mid to upper thoracic manipulations utilized for cervical pain conditions 4. Nielsen <i>et al</i>: No reports of life-threatening or 'severe' adverse events from thoracic manipulation
McKenzie Approach	<ol style="list-style-type: none"> 1. Numerous studies have investigated the effectiveness of the McKenzie method for low back pain in comparison to manual therapy, but similar studies are currently lacking for cervical pain



Example Plan of Care/Progression for Appropriate Patient

First Visit	<ol style="list-style-type: none"> 1. It is advised to avoid performing cervical manipulation during the initial visit 2. Recent research gives support to building therapeutic alliance (TA) with a patient, even suggesting patient-reported level of TA is a significant predictor of outcomes in back pain 3. Suggested/possible initial manual interventions: <ul style="list-style-type: none"> • Cervical mobilizations • Thoracic mobilizations • Cervico-thoracic junction mobility • Sub occipital release techniques • SNAGS • Upper cervical flexion-rotation MET
Second Visit	<ol style="list-style-type: none"> 1. Suggested/possible manual interventions: <ul style="list-style-type: none"> • Cervical mobilizations • Thoracic manipulation • Cervico-thoracic junction manipulation
Third Visit	<ol style="list-style-type: none"> 1. Cervical manipulation if patient is indicated <ul style="list-style-type: none"> • Waiting a few visits allows time to gauge patient response to prior manual interventions, build therapeutic alliance, and increase patient trust
Fourth Visit	<ol style="list-style-type: none"> 1. Always re-assess patient at the beginning of the visit following a cervical manipulation to measure patient response and change in status 2. Continue with interventions as appropriate based on patient response

***This example progression is not an all-inclusive approach and does not take in to account specific patient presentations; instead, it aims to provide a framework for clinical decision-making and the implementation of proper progression of forces prior to performing a cervical manipulation

***See Appendix D for example techniques



Appendix A

Level of Evidence: JOSPT 2017 CPG for Neck Pain		
Acute Neck Pain + Mobility Deficits	"C" for cervical mobilization and manipulation	"B" for thoracic manipulation and exercise
Subacute Neck Pain + Mobility Deficits	"C" for cervical mobilization and manipulation	"C" for thoracic manipulation and exercise
Chronic Neck Pain + Mobility Deficits	"B" for cervical manipulation	"B" for thoracic manipulation
Chronic Neck Pain + Radiating Pain	"B" for cervical manipulation	"B" for thoracic mobilization and manipulation
Chronic Neck Pain + Headaches	"B" for cervical mobilization and manipulation	"B" for cervicothoracic manipulation
***Note that for most conditions it is recommended manual techniques be combined with shoulder girdle and neck stretching, strengthening, and endurance exercises.		

Appendix B

2017 American Heart Association Blood Pressure Guidelines

Blood Pressure Categories



BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

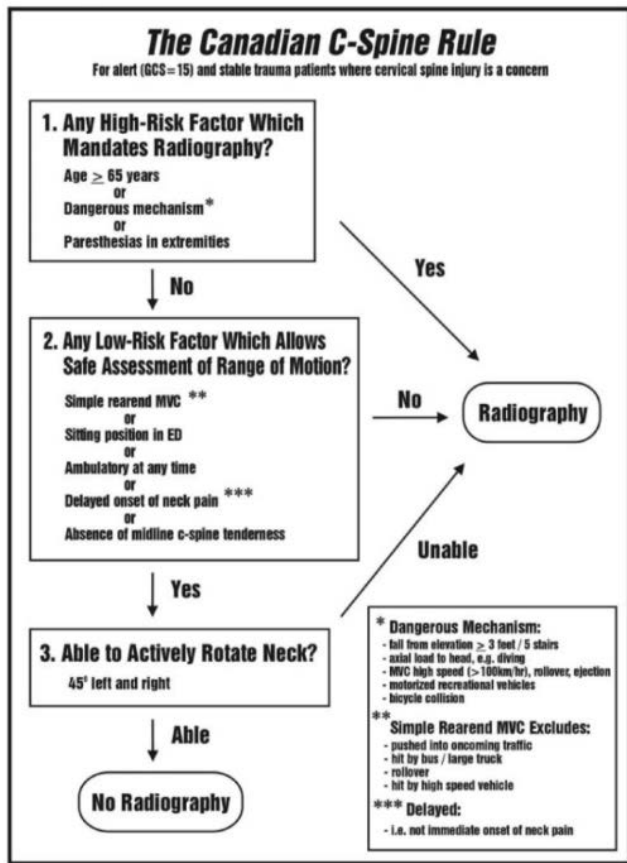


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Appendix C

Canadian C-Spine Rule

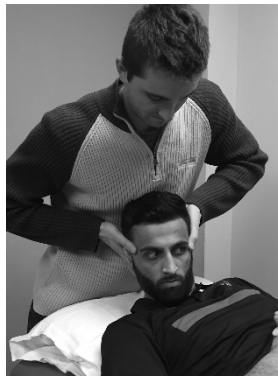
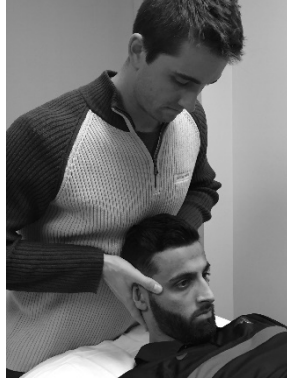


Appendix D

Example manual techniques: All techniques should be performed by a licensed Physical Therapist

Upper Cervical Flexion-Rotation Muscle Energy Technique

1. Indications: Headache and/or upper cervical hypomobility



Assessment: Take patient into end-range flexion, stabilizing head on your epigastric region. Rotate the patient's head to the right and left to assess for restriction and pain.

Treatment: Take patient into end-range flexion, rotate head toward the side of the restriction. Patient looks opposite direction with their eyes and holds for 6 seconds. Have patient look straight ahead and take patient further into rotation. Repeat 3 times. Re-assess.

Example Thoracic Manipulation Techniques

1. Seated upper thoracic / CT junction HVLAT



Patient position: Sitting facing opposite direction on the plinth with buttock to the back of the plinth. Patient will place their hands behind their neck, interlocking their fingers.

Therapist: It is recommended to use a rolled up towel between therapist's chest and the patient. Assume a staggered stance and grasp the patient's wrists while bringing patients elbows into horizontal adduction. The contact point can either be the therapist's mid-sternum or pectoral region. Introduce compression by adducting your elbows. Bring patient into slight upper thoracic flexion while maintaining strong contact point at the targeted segment. The HVLA is directed cephalad and posterior.

2. Supine mid-thoracic HVLAT



Patient position: Supine with arms folded across the chest, far arm on top. Towels can be used between patient's chest and arms as needed to create "V" posture.

Therapist: Roll patient towards you, reach around thorax and place contact point at targeted level. Roll patient back to neutral. Patient's elbows should point vertical and be directly anterior to the segment you are targeting. Contact epigastric region onto the patient's elbows. The HVLA thrust is provided directly anterior to posterior.

Cervico-Thoracic Junction

1. CT junction lateral flexion HVLAT in prone



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**Manipulation
Technique**



Patient position: Prone lying with ipsilateral arm abducted and hand on the plinth, contralateral arm resting at side.

Hand position: Lower hand contacts T1 using MCP of index finger, wrist in neutral with forearm in treatment plane. Upper hand contacts frontal bone, zygoma, or temporal bone.

Components: Have patient look up toward their hand. Lower hand performs a side-shift across bringing T1 towards the therapist. The upper hand is then used to provide a side-bending force, NOT ROTATION, which cocks C7 over T1. The HVLAT is performed by combining these two components, with 70% of the force coming from the lower hand and 30% coming from the upper hand.

**Middle
Cervical
Manipulation**

1. Cervical upward glide / rotation cradle hold HVLAT



Thrust hand contact: Articular pillow of targeted segment with radial border of proximal phalanx. Cradle hand placed on posterior/lateral occiput

Cradle hold: Weight of patient's head is balanced between your right and left hands

Create barrier: Therapist's elbows are held close to sides. Introduce contralateral rotation, then opposite side-bending using the nose as the axis

Thrust: Into rotation toward the mouth with the thrust hand while simultaneously rapidly supinating opposite forearm

2. Cervical upward glide / rotation chin hold HVLAT



Therapist position: Side of the table in staggered stance

Thrust hand contact: Articular pillow of targeted segment with radial border of proximal phalanx. Rotate the patient's head onto your opposite forearm and grip the chin lightly with your fingers

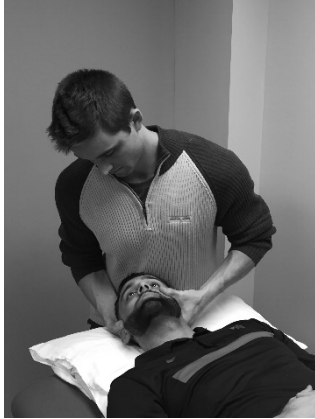
Create Barrier: Introduce contralateral rotation, then opposite side-bending using the nose as the axis

Thrust: Into rotation toward the mouth using an equal combination of motion with both hands



**Upper
Cervical
Manipulation**

1. Upper cervical HVLAT



Thrust hand contact: Radial border of proximal phalanx on arch of Atlas, elbow at 90 degrees in direction of thrust; cradle hand at posterior/lateral occiput

Create barrier: Utilize ipsilateral side-bend, side shift away by lunging forward, P-A extension, and rotation away

Thrust: Into the arc of rotation toward the undersurface of the eyes with the thrust hand while simultaneously rapidly supinating opposite forearm

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