

## CERVICAL SPINE EVALUATION & NON-SURGICAL MANAGEMENT

|                                                      |                                                                                                                      |                                          |             |
|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------|
| Original Release/Approval:                           | 1 March 2010                                                                                                         | Note: This CPG requires an annual review |             |
| Reviewed:                                            | Feb 2012                                                                                                             | Approved:                                | 19 Mar 2012 |
| Supersedes:                                          | Cervical Spine Evaluation, 30 Jun 2010                                                                               |                                          |             |
| <input type="checkbox"/> Minor Changes ( <i>or</i> ) | <input checked="" type="checkbox"/> Changes are substantial and require a thorough reading of this CPG ( <i>or</i> ) |                                          |             |
| <input type="checkbox"/> Significant Changes         | Added PI monitoring plan; C-spine clearance algorithms modified                                                      |                                          |             |

**1. Goal.** To provide a brief review of the indications for and methods of determining if a combat casualty patient has sustained a cervical spine injury.

**2. Background.**

- a. With the high incidence of explosive injury in present conflicts, providers must pay greater attention to the indications for and methods of excluding (“ruling out”) cervical spine injury, or what is popularly referred to as cervical spine clearance.
- b. Physical exam is essential for cervical spine clearance, but most patients will require some form of radiographic imaging. Imaging studies traditionally included plain radiographs in the anterior-posterior, lateral, and odontoid views. “Swimmers” or flexion-extension views have been added as adjuncts in some protocols.
- c. Computed Tomography (CT) Scanning has largely supplanted plain radiographs as the primary screening modality for patients who require imaging. In the combat environment, plain radiography should be utilized only in situations where a CT scanner is unavailable.

**3. Evaluation and Treatment.**

- a. **Indications for cervical collar placement in the pre-hospital environment.** All patients who have sustained injuries through the following mechanisms should have a cervical collar placed in the pre-hospital environment if the tactical situation allows:
  - Trauma resulting in loss of consciousness or even the question of loss of consciousness due to any form of head injury
  - Trauma resulting in temporary amnesia
  - Major explosive or blast injury
  - Mechanism that produces a violent impact on the head, neck, torso or pelvis
  - Mechanism that creates sudden acceleration/ deceleration or lateral bending forces on the neck or torso
  - Fall from height (vs. fall from standing)
  - Ejection or fall from any motorized vehicle
  - Vehicle roll-over
- 1) Any patient complaining of neck pain or displaying neurological impairment following a trauma should have a cervical collar placed.

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- 2) Patients with penetrating cervical injury from an explosive mechanism should have a cervical collar placed if possible. When a blunt mechanism is combined with a penetrating injury, the cervical collar is an important protection until unstable spinal injury is ruled out, but all providers must be aware that the collar may hide other injuries and developing pathology such as expanding hematoma. Patients with isolated penetrating cervical injury who are conscious and have no neurologic signs should not have a cervical collar placed in the pre-hospital environment. Patients with isolated penetrating brain injury do not require a cervical collar unless the trajectory suggests cervical spine involvement.
  - 3) **On the battlefield, preservation of the life of the casualty and medic are of paramount importance. In these circumstances, evacuation to a more secure area takes precedence over spine immobilization.**
  - 4) If a patient has indications for cervical collar placement, and one had not been placed in the pre-hospital environment for whatever reason, the collar should be placed at the earliest opportunity
- b. **Indications for Cervical Spine Clearance Algorithm.** Any patient with a suspected cervical spine injury and a neurologic deficit should have a cervical collar in place, and should be referred immediately for neurosurgical consultation and imaging. All other patients who have indications for pre-hospital cervical collar placement as detailed above should undergo cervical spine clearance by algorithm. There are separate algorithms for reliable ([APPENDIX A](#)) and unreliable ([APPENDIX B](#)) patients. Unreliable patients are those who cannot adequately communicate, have a decreased level of consciousness (GCS<15), or have a significant distracting injury.
- 1) Significant distracting injury is defined as any injury which is so painful that it may obscure the patient's ability to notice pain in their neck. Some evidence suggests proximity increases the risk of distraction, and therefore upper extremity and upper torso injuries are more likely to be distracting than lower torso or lower extremity injuries. The treating physician has final say in determining if a certain injury is distracting enough to render a patient unreliable and require clearance via the unreliable patient algorithm. If uncertain, err on the side of caution and consider the injury distracting and proceed accordingly.
- c. **Cervical spine clearance algorithms.** See [APPENDIX A](#) and [APPENDIX B](#) for protocol diagrams. If possible, the cervical spine should be cleared and the collar removed within 24 hours of collar placement. If the clinical scenario requires the collar remain in place over 24 hours, stiff extrication collars should be replaced with collars designed for long-term immobilization that provide greater padding and decubitus ulcer prevention.
- d. **Cervical spine clearance in the obtunded patient.** CS clearance in the obtunded patient presents additional challenges to the clinician, especially in the combat environment.
- 1) Obtunded patients with a concerning mechanism of injury should undergo CT CS imaging with fine cuts and multi-planar reconstructed images (3 mm axial, 3 mm coronal and 2 mm sagittal views).

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- 2) For the obtunded patient with a negative CT and grossly normal motor function of extremities, the risk/benefit ratio of obtaining an MRI in addition to CT is not clear at present. The incidence of significant CS instability with a negative CT CS is small but it is not zero. Occult ligamentous injury is only cleared through either a reliable clinical examination with a cooperative, extubated patient or magnetic resonance imaging (MRI). Flexion/extension radiography should not be done in the comatose patient.
  - 3) There are nontrivial risks in bringing injured, mechanically ventilated patients to the MRI suite and the first level of care offering MRI capability for CENTCOM patients is Level III, however Level IV is the first point in the medical evacuation chain where a Neuro-radiologist is available to interpret the CT MRI images. Additionally, many believe a MRI CS should be performed within 72 hours of injury to be able to adequately detect soft-tissue injury and edema. There currently is no clear evidence to support this assertion so MRI obtained at one week or more post-injury may be appropriate. Finally, metallic fragments and therapeutic hardware frequently prevent MRI scanning so, where and when possible, MRI compatible hardware (external fixators, etc.) should be utilized.
  - 4) **The clinical decision to definitively clear the CS without exclusion of ligamentous injury by either a reliable clinical examination or a MRI CS should be left to the level of care providing definitive treatment to the patient.** There is risk for significant neck movements in these obtunded patients as the transit through the aeromedical evacuation system so it is recommended that they remain with CS immobilization until arrival at their definitive level of care. The incidence of occipital skin breakdown has decreased with the utilization of collars with greater padding (e.g. Miami-J with Occian back) and increased trauma system awareness of this potential complication.
  - e. **Cervical spine clearance documentation.** It is strongly encouraged for optimal patient care that the JTTS Cervical Spine Clearance Status ([APPENDIX C](#)) be used for documenting the cervical spine evaluation and clearance status. This comprehensive note includes indications for clearance, exam, imaging studies, and final clearance status. The note is intended to bring together all cervical spine information onto one sheet of paper and was designed to improve both the completeness and ease of documentation.
- 4. System Performance Improvement (PI) Monitoring.**
- a. Intent (Expected Outcomes).
    - 1) For optimal care of these patients across the continuum, the JTTS C-spine Clearance Status sheet is utilized at the time of final disposition of the patient and documentation is complete.
    - 2) Obtunded US patients requiring C-spine clearance have a C-spine collar in place at the time of transfer to a Level IV facility.
  - b. Performance/Adherence Measures.

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- 1) The JTTS C-spine Clearance Status sheet was utilized and documentation was complete at the time of final disposition of all patients requiring C-spine clearance at the local MTF
- 2) All obtunded patients (intubated; GCS  $\leq$  8) requiring C-spine clearance had CT imaging at a Role III facility
- 3) All obtunded US patients, in addition to the above, had a C-spine collar in place at the time of transfer to a Level IV facility
- 4) All US patients with abnormal C-spine imaging had a C-spine collar in place at the time of transfer to a Level IV facility

c. Data Source.

- 1) Patient Record and the JTTS C-spine Clearance Status sheet
- 2) Joint Theater Trauma Registry (JTTR)

d. System Reporting & Frequency.

The above constitutes the minimum criteria for PI monitoring of this CPG. System reporting will be performed annually; additional PI monitoring and system reporting may be performed as needed.

The system review and data analysis will be performed by the Joint Theater Trauma System (JTTS) Director, JTTS Program Manager, and the Joint Trauma System (JTS) Performance Improvement Branch.

- 5. Responsibilities.** It is the trauma team leader's responsibility to ensure familiarity, appropriate compliance and PI monitoring at the local level with this CPG.

**6. References.**

- <sup>1</sup> Arishita GI, Vaver JS, Bellamy RF. Cervical spine immobilization of penetrating neck wounds in a hostile environment. J Trauma. 1989 Mar;29:332-7.
- <sup>2</sup> Como JJ, Leukhardt WH, Anderson JS, et al. Computed tomography alone may clear the cervical spine in obtunded blunt trauma patients: A prospective evaluation of a revised protocol. J Trauma. 2011 Feb;70:345-51. [**Special attention to post-article discussion**]
- <sup>3</sup> Como JJ, Diaz JJ, Dunham CM, et al. Practice management guidelines for identification of cervical spine injuries following trauma: Update from the Eastern Association for the Surgery of Trauma Practice Management Guidelines Committee. J Trauma. 2009;67:651-659.
- <sup>4</sup> Eastern Association for the Surgery of Trauma. Practice management guidelines for identification of cervical spine injuries following trauma – update. Available at <http://www.east.org/tpg.asp>. Accessed 20090425.
- <sup>5</sup> Emergency War Surgery Handbook. Third United States Revision. Borden Institute, Walter Reed Army Medical Center, Washington, DC, 2004.
- <sup>6</sup> Heffernan DS, Schermer CR, Lu SW. What defines a distracting injury in cervical spine assessment? J Trauma. 2005 Dec;59:1396-9.

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- <sup>7</sup> Hoffman JR, Mower WR, Wolfson AB, et al. Validity of a set of clinical criteria to rule out injury to the cervical spine in patients with blunt trauma. *New Engl J Med*. 2000 Jul;343:94-99.
- <sup>8</sup> Mahoney PF, Steinbruner D, Mazur R, et al. Cervical spine protection in a combat zone. *Injury*. 2007 Oct;38:1222-20.
- <sup>9</sup> Menaker J, Philp A, Boswell S, et al. Computed tomography alone for cervical spine clearance in the unreliable patient-are we there yet? *J Trauma*. 2008 Apr;64:898-903; discussion 903-4.
- <sup>10</sup> Salomone JP, Pons PT, McSwain NE, eds. *PHTLS Prehospital Life Support: Military Version*, Mosby Elsevier, St. Louis, Sixth Edition, 2007.

Approved by CENTCOM JTTS Director,  
JTS Director and CENTCOM SG

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| Opinions, interpretations, conclusions, and recommendations are those of the authors and are not necessarily endorsed by the Services or DoD. |
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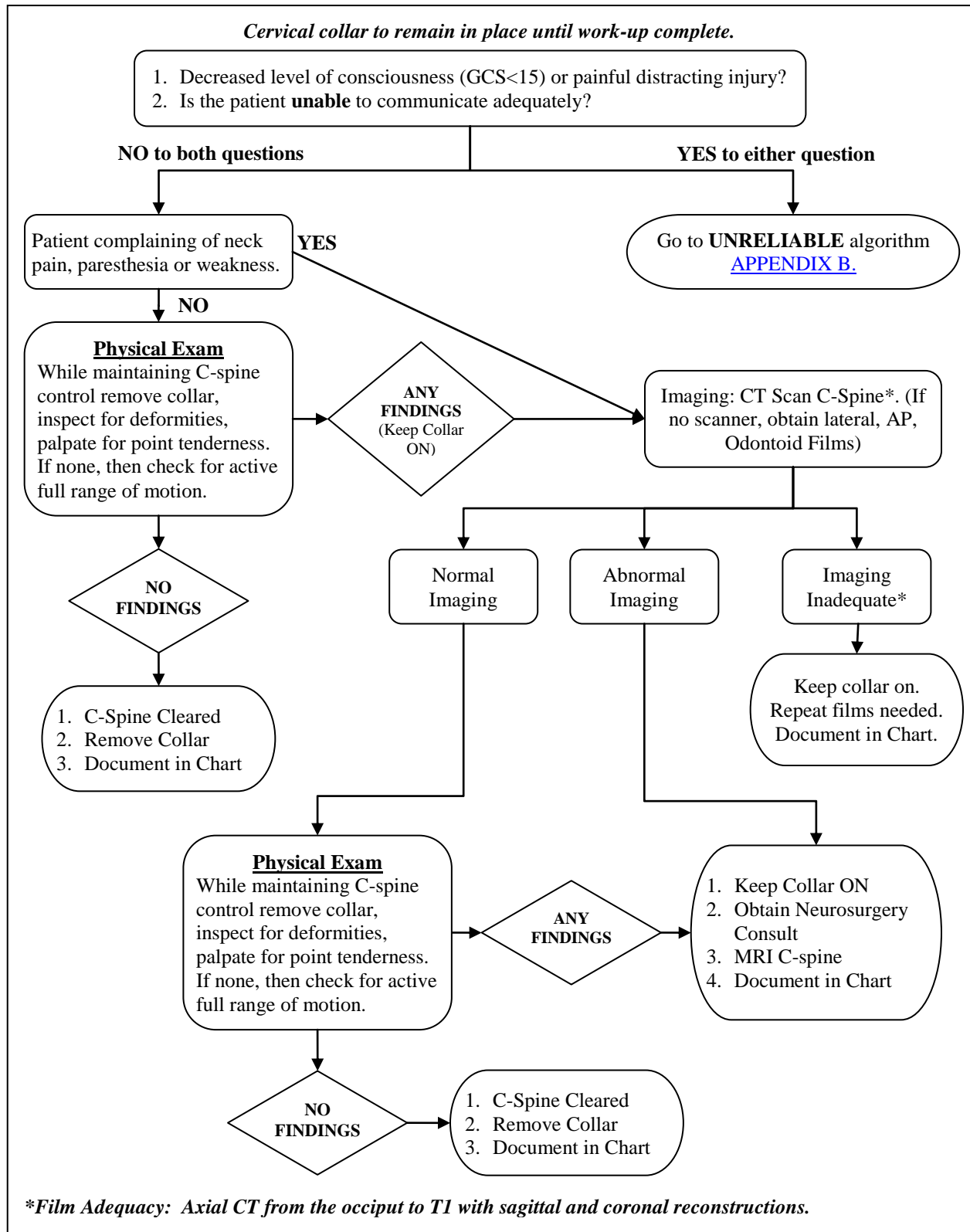
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Cervical Spine Evaluation & Non-surgical Management

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## APPENDIX A CERVICAL SPINE CLEARANCE ALGORITHM RELIABLE PATIENT WITH NO NEUROLOGIC DEFICIT

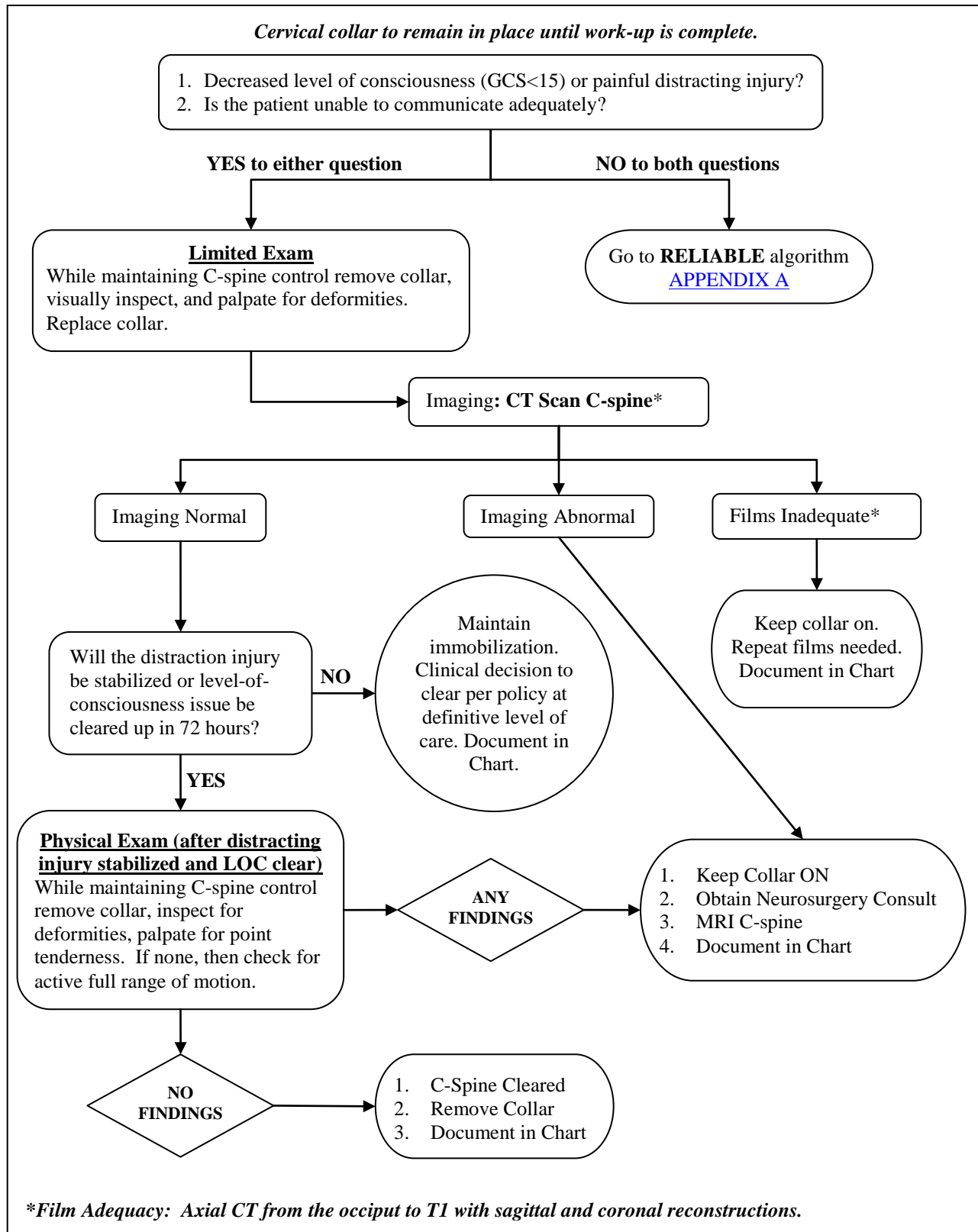


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## APPENDIX B CERVICAL SPINE CLEARANCE ALGORITHM UNRELIABLE PATIENT



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## APPENDIX C JOINT THEATER TRAUMA SYSTEM CERVICAL SPINE CLEARANCE STATUS

| <b><u>JOINT THEATER TRAUMA SYSTEM - CERVICAL SPINE CLEARANCE STATUS</u></b>                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mechanism:                                                                                                                                             | <input type="checkbox"/> Explosive <input type="checkbox"/> MVC <input type="checkbox"/> Fall <input type="checkbox"/> Other                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Notes:                                                                                                                                                 | _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Collar placed:                                                                                                                                         | <input type="checkbox"/> Pre-hospital <input type="checkbox"/> Hospital <input type="checkbox"/> No Collar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Patient</b>                                                                                                                                         | <input type="checkbox"/> Altered Mental Status (GCS<15)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>RELIABLE?</b>                                                                                                                                       | <input type="checkbox"/> Yes <input type="checkbox"/> No    Reason Unreliable: <input type="checkbox"/> Significant Distracting Injury                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Notes:                                                                                                                                                 | _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Patient</b>                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Complaints</b>                                                                                                                                      | <input type="checkbox"/> None <input type="checkbox"/> Neck Pain (where: _____) <input type="checkbox"/> Paresthesia                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Notes:                                                                                                                                                 | _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b><u>Physical Findings</u></b>                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Inspection:</b>                                                                                                                                     | <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Palpation:</b>                                                                                                                                      | <input type="checkbox"/> Normal <input type="checkbox"/> Point Tenderness <input type="checkbox"/> Deformity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Notes:                                                                                                                                                 | _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Active Range of Motion:</b>                                                                                                                         | <input type="checkbox"/> Full <input type="checkbox"/> Limited: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Notes:                                                                                                                                                 | _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b><u>Imaging Studies</u></b> [CT is Standard. Films acceptable only when CT is unavailable]                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>CT SCAN:</b>                                                                                                                                        | <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Notes:                                                                                                                                                 | _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <i>Lateral</i>                                                                                                                                         | <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>AP</i>                                                                                                                                              | <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <i>Odontoid</i>                                                                                                                                        | <input type="checkbox"/> Normal <input type="checkbox"/> Abnormal: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>C L E A R A N C E</b>                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>The Cervical Spine is:</b>                                                                                                                          | <input type="checkbox"/> <b>CLEAR</b> of significant injury and instability on the basis of the following:<br><input type="checkbox"/> Normal exam in completely reliable patient with no need for imaging.<br><input type="checkbox"/> Normal imaging of full C-Spine and normal exam.<br><input type="checkbox"/> <b>NOT CLEAR</b> on the basis of the following:<br><input type="checkbox"/> Neurological complaint or abnormal physical exam finding<br><input type="checkbox"/> Abnormal imaging<br><input type="checkbox"/> Unreliable patient at time of evacuation /final disposition |
| Physician _____ / _____                                                                                                                                | MTF: _____ Date/Time: _____                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Print Name                                                                                                                                             | Signature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <small>PATIENT'S IDENTIFICATION: (For typed or written entries give: Name – last, first, middle; ID No or SSN; Sex; Date of Birth; Rank/Grade)</small> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>JTTS Cervical Spine Clearance Note</b>                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Medical Record (Rev. May 2009)                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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## APPENDIX D ADDITIONAL INFORMATION REGARDING OFF-LABEL USES IN CPGs

### 1. Purpose.

The purpose of this Appendix is to ensure an understanding of DoD policy and practice regarding inclusion in CPGs of “off-label” uses of U.S. Food and Drug Administration (FDA)–approved products. This applies to off-label uses with patients who are armed forces members.

### 2. Background.

Unapproved (i.e., “off-label”) uses of FDA-approved products are extremely common in American medicine and are usually not subject to any special regulations. However, under Federal law, in some circumstances, unapproved uses of approved drugs are subject to FDA regulations governing “investigational new drugs.” These circumstances include such uses as part of clinical trials, and in the military context, command required, unapproved uses. Some command requested unapproved uses may also be subject to special regulations.

### 3. Additional Information Regarding Off-Label Uses in CPGs.

The inclusion in CPGs of off-label uses is not a clinical trial, nor is it a command request or requirement. Further, it does not imply that the Military Health System requires that use by DoD health care practitioners or considers it to be the “standard of care.” Rather, the inclusion in CPGs of off-label uses is to inform the clinical judgment of the responsible health care practitioner by providing information regarding potential risks and benefits of treatment alternatives. The decision is for the clinical judgment of the responsible health care practitioner within the practitioner-patient relationship.

### 4. Additional Procedures.

- a. Balanced Discussion. Consistent with this purpose, CPG discussions of off-label uses specifically state that they are uses not approved by the FDA. Further, such discussions are balanced in the presentation of appropriate clinical study data, including any such data that suggest caution in the use of the product and specifically including any FDA-issued warnings.
- b. Quality Assurance Monitoring. With respect to such off-label uses, DoD procedure is to maintain a regular system of quality assurance monitoring of outcomes and known potential adverse events. For this reason, the importance of accurate clinical records is underscored.
- c. Information to Patients. Good clinical practice includes the provision of appropriate information to patients. Each CPG discussing an unusual off-label use will address the issue of information to patients. When practicable, consideration will be given to including in an appendix an appropriate information sheet for distribution to patients, whether before or after use of the product. Information to patients should address in plain language: a) that the use is not approved by the FDA; b) the reasons why a DoD health care practitioner would decide to use the product for this purpose; and c) the potential risks associated with such use.