

Updates in Cervical Spine Precautions & Cervical Collar Placement in Trauma Patients (Quick Reference for EM Physicians)

Adults

- In recent years, debate has continued over whether the routine application of a semi-rigid cervical collar +/- the use of a rigid backboard is necessary for the transport and initial evaluation of trauma patients¹²
- Evidence exists suggesting there are complications related to cervical collar placement and backboard use in trauma patients beyond simply discomfort, including increased risk for aspiration and respiratory issues, elevated intracranial pressure, development of pressure wounds and skin breakdown, and delays in airway management and completion of evaluation³
- Although there is an abundance of published literature on spinal immobilization in trauma patients, there is a lack of randomized control trials evaluating the benefits of spinal immobilization in this population⁴
- Clinical decision rules based on large trials (NEXUS, CCR) for assessing the necessity of cervical spine imaging have now existed for over two decades, these tools can be applied for clearance of the cervical spine without imaging in a subset of trauma patients⁵⁶
- Both rules mentioned above have been externally validated in subsequent studies at multiple clinical sites and when applied by both physicians and nurses⁷⁸⁹
- A recently published single-center prospective cohort study with >4,000 patients suggested paramedics can safely and effectively clear the cervical spine in low-risk trauma patients, significantly reducing the need for immobilization during transport¹⁰
- Evidence does not exist for clearance of the cervical spine without imaging in altered (GCS <15) or unstable trauma patients

Pediatrics

- Fortunately, cervical spine injuries secondary to trauma are rare in pediatric patients, however they are associated with high morbidity and mortality
- Due to a lack of high-quality evidence in the pediatric population, most guidelines are based on expert opinion¹¹
- For patients with low clinical suspicion of injury, there are assessments and clinical decision tools which can be used to clear the cervical spine without imaging, or by utilizing simple radiographs prior to CT¹²
- There is no strong recommendation of initial imaging modality for assessment¹³

¹ Orman R, Colwell C (2016)

² Buck A, Colwell C (2017)

³ Deasy C, Cameron P (2011)

⁴ Kwan I *et al* (2001)

⁵ Hoffman JR *et al* (2001)

⁶ Stiell IG *et al* (2001)

⁷ Stiell IG *et al* (2010)

⁸ Coffey F *et al* (2011)

⁹ Tran J *et al* (2016)

¹⁰ Vaillancourt *et al* (2022)

¹¹ Copley *et al* (2019)

¹² Hannon *et al* (2015)

¹³ Rozzelle CJ *et al* (2013)

Updates on Cervical Spine Clearance after Negative Imaging Computed Tomography (CT) Imaging:

- In 2015, the Eastern Association for the Surgery of Trauma (EAST) conducted a systematic review of 11 studies examining CT cervical spine imaging in obtunded patients, with over 1,700 total subjects, which showed a negative predictive value (NPV) of CT for unstable cervical spine injury of 100% in this population¹⁴
- Based on this review, EAST gave a conditional recommendation for removal of cervical collar after negative CT cervical spine in obtunded patients
- In 2017, the Western Trauma Association (WTA) conducted a multicenter trial involving over 10,000 patients with traumatic injury and reported CT imaging of the cervical spine missed only 3 clinically significant injuries, for a NPV of 99.97%¹⁵
- When CT imaging was combined with clinical exam for focal neurologic deficit, the NPV was 100%
- The WTA proposed an algorithm based on this study that would allow cervical spine clearance in trauma patients with negative CT imaging and negative physical/neurologic exam, without the need for additional imaging for other persistent symptoms
- Most of the centers included in these studies were trauma centers with modern high-quality multiplanar CT scanners and radiologists familiar with reading these studies
- Institutions without radiologists who are experienced at reading imaging of patients with traumatic injury or without modern CT scanners may take a more conservative approach in management of this patient population

¹⁴ Patel *et al* (2015)

¹⁵ Inaba *et al* (2016)

References

- Orman R, Colwell C. Do we still need the C-collar? EM:RAP. <https://www.emrap.org/episode/feb2016emrap/dowestillneed>. Published February 6, 2016. Accessed December 13, 2022.
- Buck A, Colwell C. The Great C-Collar Debate. EM:RAP. <https://www.emrap.org/episode/januaryhotsheet/thegreatccollar>. Published January 1, 2017. Accessed December 13, 2022.
- Deasy C, Cameron P. Routine application of cervical collars--what is the evidence?. *Injury*. 2011;42(9):841-842. doi:10.1016/j.injury.2011.06.191
- Kwan I, Bunn F, Roberts I. Spinal immobilisation for trauma patients. *Cochrane Database Syst Rev*. 2001;2001(2):CD002803. doi:10.1002/14651858.CD002803
- Hoffman JR, Mower WR, Wolfson AB, Todd KH, Zucker MI. Validity of a set of clinical criteria to rule out injury to the cervical spine in patients with blunt trauma. National Emergency X-Radiography Utilization Study Group [published correction appears in *N Engl J Med* 2001 Feb 8;344(6):464]. *N Engl J Med*. 2000;343(2):94-99. doi:10.1056/NEJM200007133430203
- Stiell IG, Wells GA, Vandemheen KL, et al. The Canadian C-spine rule for radiography in alert and stable trauma patients. *JAMA*. 2001;286(15):1841-1848. doi:10.1001/jama.286.15.1841
- Stiell IG, Clement CM, O'Connor A, et al. Multicentre prospective validation of use of the Canadian C-Spine Rule by triage nurses in the emergency department. *CMAJ*. 2010;182(11):1173-1179. doi:10.1503/cmaj.091430
- Coffey F, Hewitt S, Stiell I, et al. Validation of the Canadian c-spine rule in the UK emergency department setting. *Emerg Med J*. 2011;28(10):873-876. doi:10.1136/emj.2009.089508
- Tran J, Jeanmonod D, Agresti D, Hamden K, Jeanmonod RK. Prospective Validation of Modified NEXUS Cervical Spine Injury Criteria in Low-risk Elderly Fall Patients. *West J Emerg Med*. 2016;17(3):252-257. doi:10.5811/westjem.2016.3.29702
- Vaillancourt C, Charette M, Sinclair J, et al. Implementation of the Modified Canadian C-Spine Rule by Paramedics [published online ahead of print, 2022 Oct 31]. *Ann Emerg Med*. 2022;S0196-0644(22)01030-7. doi:10.1016/j.annemergmed.2022.08.441
- Copley PC, Tilliridou V, Kirby A, Jones J, Kandasamy J. Management of cervical spine trauma in children. *Eur J Trauma Emerg Surg*. 2019;45(5):777-789. doi:10.1007/s00068-018-0992-x
- Hannon M, Mannix R, Dorney K, Mooney D, Hennelly K. Pediatric cervical spine injury evaluation after blunt trauma: a clinical decision analysis. *Ann Emerg Med*. 2015;65(3):239-247. doi:10.1016/j.annemergmed.2014.09.002
- Rozzelle CJ, Aarabi B, Dhall SS, et al. Management of pediatric cervical spine and spinal cord injuries. *Neurosurgery*. 2013;72 Suppl 2:205-226. doi:10.1227/NEU.0b013e318277096c
- Patel MB, et al. Cervical spine collar clearance in the obtunded adult blunt trauma patient: A systematic review and practice management guideline from the Eastern Association for the Surgery of Trauma. *J Acute Care Trauma Surgery*. 789(2): 432-441.
- Inaba, K et al. Cervical Spine Clearance: A Prospective Western Trauma Association Multi-Institutional Trial. *J Trauma Acute Care Surg*. 2016 Dec; 81(6): 1122-1130. doi: 10.1097/TA.0000000000001194