

**Journal Club Synopsis**  
**Block 5, November 12, 2014**  
**Discussion Leader: Derek Broering**  
**Mentors: Leslie Vojta and James Olson**

**Scenario:**

A 52 year old male with no PMH presents to the ED by EMS after a motor vehicle accident. On arrival the patient was in full immobilization. His vital signs are within normal limits. The patient denies LOC. The car reportedly hit a telephone pole. The vehicle was traveling approximately 35 mph, and the patient was wearing a seatbelt. There was no heavy damage, but the airbag did deploy. He denies complaints such as chest pain or shortness of breath. On exam he has no acute distress; there is no evidence of head or neck injury. Auscultation reveals normal heart tones. Breath sounds are clear and equal bilaterally. On chest inspection there is no seatbelt sign. On palpation there is no point tenderness, subcutaneous crepitus, or obvious flail chest. Abdominal and extremity exams are also unremarkable. While thinking about how to work up this patient you remember seeing an article about a clinical decision rule for blunt chest trauma; what evidence is there for this rule?

**Introduction:**

Patients with blunt chest trauma are commonly seen in the emergency department. It is not always clear whether chest imaging studies such as CXR and/or CT are indicated. Physicians can disagree about which patients require chest CT after blunt trauma up to 40% of the time. This wide discrepancy motivated researchers to develop a rule to help ensure imaging is appropriately performed. This yielded the NEXUS Chest rule which was discussed during journal club.

**Group 1:**

Whole-body computed tomographic scanning leads to better survival as opposed to selective scanning in trauma patients: A systematic review and meta-analysis. Caputo ND, Stahmer C, Lim G, Shah K. J Trauma Acute Care Surg. 2014 Oct;77(4):534-9. doi: 10.1097/TA.0000000000000414. PubMed PMID: 25250591.

This is a meta-analysis based mostly on retrospective studies; it concluded that trauma patients who underwent whole-body CT (head, neck, chest, ab, and pelvis) had lower overall mortality when compared to patients who underwent selective imaging (16.9; 95% confidence interval [CI], 16.3-17.6 vs. 20.3; 95% CI, 19.6-21.1,  $p < 0.0002$ , respectively). The study did not discuss which patients required whole body CT.

**Group 2:**

Derivation of a decision instrument for selective chest radiography in blunt trauma. Rodriguez RM, Hendey GW, Mower W, Kea B, Fortman J, Merchant G, Hoffman JR. J Trauma. 2011 Sep;71(3):549-53. doi: 10.1097/TA.0b013e3181f2ac9d. PubMed PMID: 21045745

NEXUS chest: validation of a decision instrument for selective chest imaging in blunt trauma. Rodriguez RM, Anglin D, Langdorf MI, Baumann BM, Hendey GW, Bradley RN, Medak AJ, Raja AS, Juhn P, Fortman J, Mulkerin W, Mower WR. JAMA Surg. 2013 Oct;148(10):940-6. doi: 10.1001/jamasurg.2013.2757. Erratum in: JAMA Surg. 2013 Dec;148(12):1086. PubMed PMID: 23925583

The derivation study was a prospective observational study performed at three level 1 trauma centers. A decision instrument with seven variables was derived. The NEXUS Chest rule consists of:

1. Age > 60 years
2. Rapid deceleration mechanism (fall > 20 ft or MVC > 40 mph)
3. Chest pain
4. Intoxication
5. Abnormal mental status
6. Distracting painful injury
7. Tenderness to chest wall palpation

The rule was validated in a prospective, observational study; which was conducted at 9 level 1 trauma centers in the United States. For the validation study 9,905 patients were enrolled prospectively. The NEXUS Chest rule was found to have the following characteristics: Sensitivity 98.8% (95% CI, 98.1% – 99.3%), Specificity 13.3% (95% CI, 12.6%-14.1%), Negative Predictive Value 98.5% (95% CI, 97.6-99.1%), Positive Predictive Value 16.7% (95% CI, 15.9-17.5%), Negative Likelihood Ratio 0.09 (95% CI, 0.05-0.14).

#### **Discussion:**

After discussion amongst residents and faculty a few conclusions were drawn about the NEXUS Chest rule. Most agreed the rule could help confirm the clinician's gestalt when considering forgoing imaging. The rule was noted to be nonspecific and will not likely significantly decrease the number of chest imaging studies. It should also be noted that some patients in the validation study who meet the criteria and did not require chest imaging had significant extra-thoracic injuries such as traumatic subarachnoid hemorrhage and pelvic bleeding (it would be hard to imagine the trauma team admitting a patient with a SAH, but no cxr). The validation study was performed by the same group of researchers that derived the decision rule; in the future a study performed by other authors may help further validate the rule. It should also be noted that the meta-analysis of whole body CT did not discuss which patients warranted the imaging studies. Determining which trauma patients that may or may not require imaging is an area that is ripe for future research.