Appropriate Cervical Spine Radiography and CT Imaging in Trauma

Measure Description

Rationale: Cervical spine imaging is routinely performed in adult patients presenting after trauma. A current NQF–endorsed standard (NQF # 0512) targets plain radiography in an attempt to reduce unnecessary imaging. However, CT imaging is increasingly used as the initial imaging modality of choice for this indication. Clinical decision rules to identify adults with mild traumatic injury at very low risk of cervical spine injury have been validated using plain radiography and can be applied to CT as well, when used as an initial imaging modality (Canadian C-Spine Rule or the NEXUS Low-Risk Criteria).1 2

Goal: To reduce the unnecessary use of cervical spine radiography and CT in extremely low-risk trauma patients.

Measure: Percent of adult patients undergoing cervical spine radiography or CT imaging for trauma who have a documented evidence-based indication prior to imaging (Canadian C-Spine Rule or the NEXUS Low-Risk Criteria).

Level of Analysis: Facility

Organization: Partners Health Care / University of Washington

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### Measure Title

Appropriate Cervical Spine Radiography and CT Imaging in Trauma

### Brief description of measure

Percent of adult patients undergoing cervical spine imaging (defined as three or more radiographs or CT) for trauma who have a documented evidence-based indication prior to imaging (Canadian C-Spine Rule or the NEXUS Low-Risk Criteria).

### Numbers

ED-Rad-2

### Numerator Statement

Number of denominator patients who have a documented evidence-based indication prior to imaging.

### Numerator Details

Number of patients who receive cervical spine imaging who either:

1. Fulfill any of the following NEXUS Low-Risk Criteria* for cervical spine injury:
   - posterior mid-line cervical spine tenderness
   - painful distracting injury
   - neurological deficits
   - reduced level of consciousness or intoxication

   OR

2. Fulfill the Canadian Cervical Spine Rule Criteria* for cervical spine radiography by having
   a. Any of the following high risk factors that mandates imaging
      - Dangerous Mechanism**
      - Paresthesias in the extremities
   or (b & c)
   b. None of the following low-risk factors that allows safe assessment of range of motion.
      i. Simple rear-end collision (excluding rollover, collision with bus, large truck, vehicle traveling at high speeds or being pushed into oncoming traffic), or
      ii. Patient found sitting in the Emergency Department, or
      iii. Ambulatory after the incident, or
      iv. Delayed onset of neck pain, or
      v. Absence of any midline cervical spine tenderness.

   and

   c. inability to adequately “range of motion” their neck.
   - Is the patient able to actively rotate the neck 45 degrees to the left and right? (If the patient is unable, imaging should be performed; otherwise radiography imaging should not be performed).

*The clinical decision rules were developed for plain radiography, but are appropriate for similarly selected patients in whom CT is the initial imaging modality

**Dangerous mechanisms include a fall from an elevation of 3 feet or 5 stairs, an axial load to the head (e.g., diving); a motor vehicle collision at high speed (>100 kph [60 mph]), or with rollover or ejection; a collision involving a motorized recreational vehicle, or a bike collision.

### Denominator Statement

Number of adult patients undergoing cervical spine radiography or CT for trauma (as initial imaging of cervical spine).
Emergency Department Imaging Efficiency Measures

| Denominator Inclusion | - Age 16 - 65 years of age  
|                        | - Underwent cervical spine imaging as initial full imaging test of the cervical spine  
|                        | - Traumatic indication for imaging |

| Denominator Exclusions | - Patients who have not experienced trauma  
|                       | - <16 years of age or >65 years of age  
|                       | - Patients with a reduced ability to communicate (verbal or cognitive dysfunction)  
|                       | - Underwent prior cervical spine radiograph (3 view or more) which is interpreted as inadequate to fully assess fracture  
|                       | - Underwent prior imaging concerning or diagnostic for injury of the cervical spine requiring further imaging |

| Data Source | Initial sampling will be based upon patients receiving a cervical spine imaging (based on appropriate CPT or HCPCS procedure code) in the ED. Chart review, electronic medical record (EMR) or clinically enriched administrative data (e.g. CPT-2 codes). It is not possible to collect this measure from standard administrative data. |

| Intended Use | Accountability Measure |

| Specification Notes | There is already an NQF approved standard similar to this covering plain c-spine radiographs in trauma (the intention is to harmonize these measures). The clinical decision rules were developed for plain radiography, but are appropriate for similarly selected patients in whom CT scanning is the initial imaging modality |

FLOW CHART: Appropriate Cervical Spine Imaging (radiography or CT) in Trauma

Emergency Department patients:
- Age 16 - 65 years of age
- Underwent cervical spine imaging as initial test
- Traumatic indication for imaging

Exclude number of patients:
- not experienced recent trauma
- <16 years of age or >65 years of age
- reduced ability to communicate, including intoxication

DENOMINATOR
Denominator A (ImagedXR): Number of adult patients undergoing cervical spine radiography for trauma (as initial full imaging of C-spine).
Denominator B (ImagedCT): Number of adult patients undergoing cervical spine CT for trauma (as initial full imaging of C-spine).
Denominator C (Imagedtotal): Number of adult patients undergoing cervical spine imaging for trauma (ImagedXR + ImagedCT)

CANADIAN C-SPINE RULE
High risk factors that mandate imaging
- Dangerous Mechanism**
- Paresthesias in extremities

NEXUS CRITERIA
Number of patients who fulfill a high risk factor:
- posterior mid-line cervical spine tenderness
- painful distracting injury
- neurological deficits
- reduced level of consciousness or
- Dangerous Mechanism**
- Paresthesias in the extremities

CANADIAN C-SPINE RULE
Low risk factors, allowing assessment of range of motion?

i. Simple rear-end collision (excluding rollover, collision with bus, large truck, vehicle traveling at high speeds or being pushed into oncoming traffic), or
ii. Patient found sitting in the Emergency Department, or
iii. Ambulatory after the incident, or
iv. Delayed onset of neck pain, or
v. Absence of any midline cervical spine

ABLE - Imaging not indicated

CANADIAN C-SPINE RULE
Unable to actively rotate neck ≥ 45° left and right

UNABLE

NUMERATORS = Patients meeting criteria for C Spine imaging.
Numerator A (AppXR) No of patients meeting criteria in whom radiography was performed.
Numerator B (AppCT): No of patients meeting criteria in whom CT was performed.
Numerator C (AppImage): No of patients meeting criteria in whom imaging was performed (AppXR+AppCT)

MEETS NEXUS CRITERIA

Imaging not indicated

Partners HealthCare / University of Washington, 2010