MODIFIED IMAGING ALGORITHM FOR PATIENTS PRESENTING WITH SUSPECTED ACUTE CORD COMPRESSION (ACC) IN THE EMERGENCY ROOM

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OBJECTIVES

• Review Process Improvement Methods used to create a targeted Acute Cord Compression MRI Imaging Protocol

• Discuss methods of intervention to optimize workflow and assessment metrics

• Review Data Results and Future Directions
BACKGROUND

• MRI is a lengthy imaging modality, requiring safety checks before the exam and a carefully scripted and curated order of sequences to answer the clinical question(s)

• **Acute spinal cord compression (ACC)**, whether caused by bone, disc, blood, infection, tumor or foreign body, is considered a neurosurgical emergency with potential for devastating outcomes
  • An opportunity exists to potentially mitigate morbidity and mortality through prompt surgical decompression

• Increasing utilization of MRI through emergency departments, and health care systems, has increased wait times for critically ill/injured patients

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GOALS

• Form a collaborative multidisciplinary team to work on quality improvement project facilitated by Lean QI techniques

• Improve the speed (Order Placement to Scan Start) of receiving a total spine MRI for ED patients presenting with symptoms of acute cord compression/cauda equina syndrome by at least 20%

• Reduce “table time” to complete the total spine MRI performed for acute cord compression by at least 20%
  • New 2 sequence total spine protocol created to rapidly rule in or rule out acute cord compression
**Project Name:** Rapid MRI Imaging for Acute Cord Compression  
Last updated: 10/13/19

### Goal/Target

- Reduce MRI order to begin metric by 20%
- Reduce MRI begin to complete metric by 20%

### Problem Statement

Acute spinal cord compression is a neurosurgical emergency that needs to be diagnosed rapidly. In completing this project, our goal is to put a process in place to complete a total spine MRI efficiently in order to begin timely intervention.

### High Level Work

- **Situation/Current Conditions**
  - Reduce MRI order to begin metric by 20%
  - Reduce MRI begin to complete metric by 20%

- **Data Collection Plan:**
  Data was pulled from the EPIC Radiant system from 10/1/17 through 3/31/18. This data includes key metrics for MRI total spine studies in our current workflow state.

- **Graphical Analysis**
  - MRI Total Spine Exam Data (metric in minutes)

- **Potential Risks:**
  - Overuse of the rapid scan protocol
  - Misuse of the rapid scan protocol
  - Missed pathology due to the lack of detail in the abbreviated scan

- **Recommendations for Improvement:**
  - Create a new EPIC IMG MRI code to order these specific scans
  - Implement a new workflow to complete these cases in a rapid timeframe to ensure timely intervention
  - Involve the spine service to consult on all cases with suspected acute cord compression
  - Create new rapid MRI spine protocol with axial T2 and sagittal STIR

- **Achievement:**
  - Reduced order placement to scan begin time by 47% (from 255 minutes to 124 minutes)
  - Reduced total scan time by 50% (from 54 to 27 minutes)

- **Sustainability Plan:**
  Quarterly review of exams ordered with ACC and goal metrics
Acute Cord Compression (ACC) Protocol

Patient Presents

Symptoms of cauda equina syndrome or neurologic dysfunction suspected to be related to cord compression

Duration of Symptoms Over 48 Hours?

Yes

Symptoms Stable?

Yes

No need for emergent spinal imaging. Urgent or routine MRI can be obtained.

No

ED Attending assesses patient & agrees with the need for ACC

Acute cord compression MRI C/T/L spine without contrast ordered. Life-threatening priority utilized.

Spine Surgery notified of potential acute cord compression case

Clinical/ED team expedites completion of MRI safety sheet and notifies neuroradiology of order at 200-3181 to protocol

ED Nursing/Clinical team transports patient to MRI Department

Acute cord compression protocol used. After axial and sagittal imaging done tech calls neuroradiologist to check if additional imaging needed.

GOAL: MRI safety sheet completion to scan start time of < 2 hours

Spine Surgery notified for formal consultation if MRI reveals potential cord compression

Last Revised 7/11/18
New EPIC order created for cases of suspected ACC

1. Defaults to highest “Life Threatening” Priority (green arrow)
2. Title of exam contains cord compression verbiage (red box)
3. Field created for name of approving ED attending clinician (purple arrow)
CURRENT PROTOCOL FOR TOTAL SPINE MRI

Pre ACC Protocol: 54 Minutes
ACC Protocol: 27 Minutes
50% Time Reduction
RESULTS
- Significant reduction in variation
- Median time from MRI order placement to exam begin was reduced by 47% (from 255 minutes to 124 minutes).
- Median MRI scan “table time” was reduced by 50% (from 54 to 27 minutes).
- Rate of “positive” exams pre and post intervention was similar (35% and 32% respectively).
• Radiology led QI project resulted in a new multi-specialty designed/approved EMR order and clinical workflow with creation of a new truncated non-contrast total spine MRI Acute Cord Compression (ACC) protocol
  • Goal metrics were surpassed with reductions in MRI scan 'table' time by 47% and decrease delay from MRI order to begin by 50%.
  • Variation in O to B time was also reduced

• Creation of a new diagnosis specific protocol required detailed data analysis before and after intervention and close collaboration between multiple specialties involved in the management of these patients.

• Through this collaboration we were able to reach agreement on which patients this expedited algorithm should be employed, with sustainment of appropriate order set utilization and maintenance of goal metrics to date