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 ❖

❖ Rankey, D., Leach, J. L., & Leach, S. D. (2008). Emergency MRI utilization trends at a tertiary care academic medical center: baseline data. *Acad Radiol, 15*(4), 438-443. doi:10.1016/j.acra.2008.01.003

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

A3 FORM CREATION

Yale NewHaven Health

Project Name: Rapid MRI Imaging for Acute Cord Compression

Last updated: 10/13/19

Team Members

Project Sponsors: **Dr. Jay Pahade**

Project Coach: Jeff Cotton

Project Leader(s): David Facchini

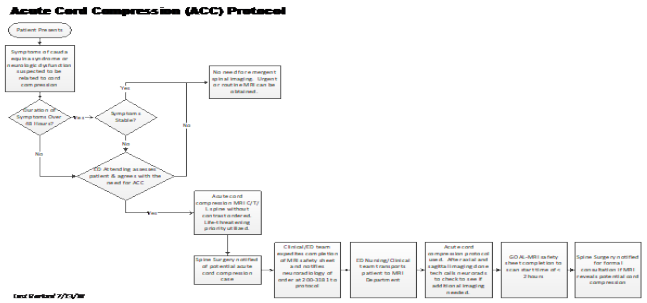
Team Members:

Dr. Jeff Weinreb, Sandi Barbiero, Bernadette Mele, Dr. Frank Minja, Dr. Max Laurans, Dr. Marc Shapiro, Dr. Gordon Sze, Dr. Vic Parwani, Dr. Jason Jones, Maureen Perachio, Dr. Andrew Ulrich

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

See data slide

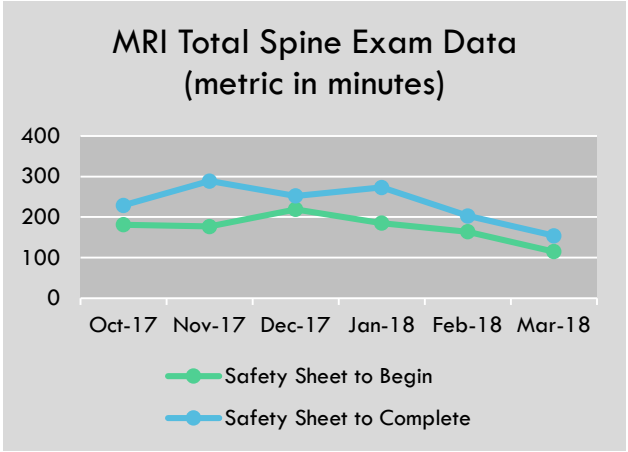
Goal/Target

- **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



Statistical Analysis

See data slide

Background

We have had some real life examples of extended delays for diagnosing and treating acute cord compression recently. The current workflow process is very complicated, and we believe it can be streamlined in specific circumstances to better serve our patients.

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
  - BPA
- 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:

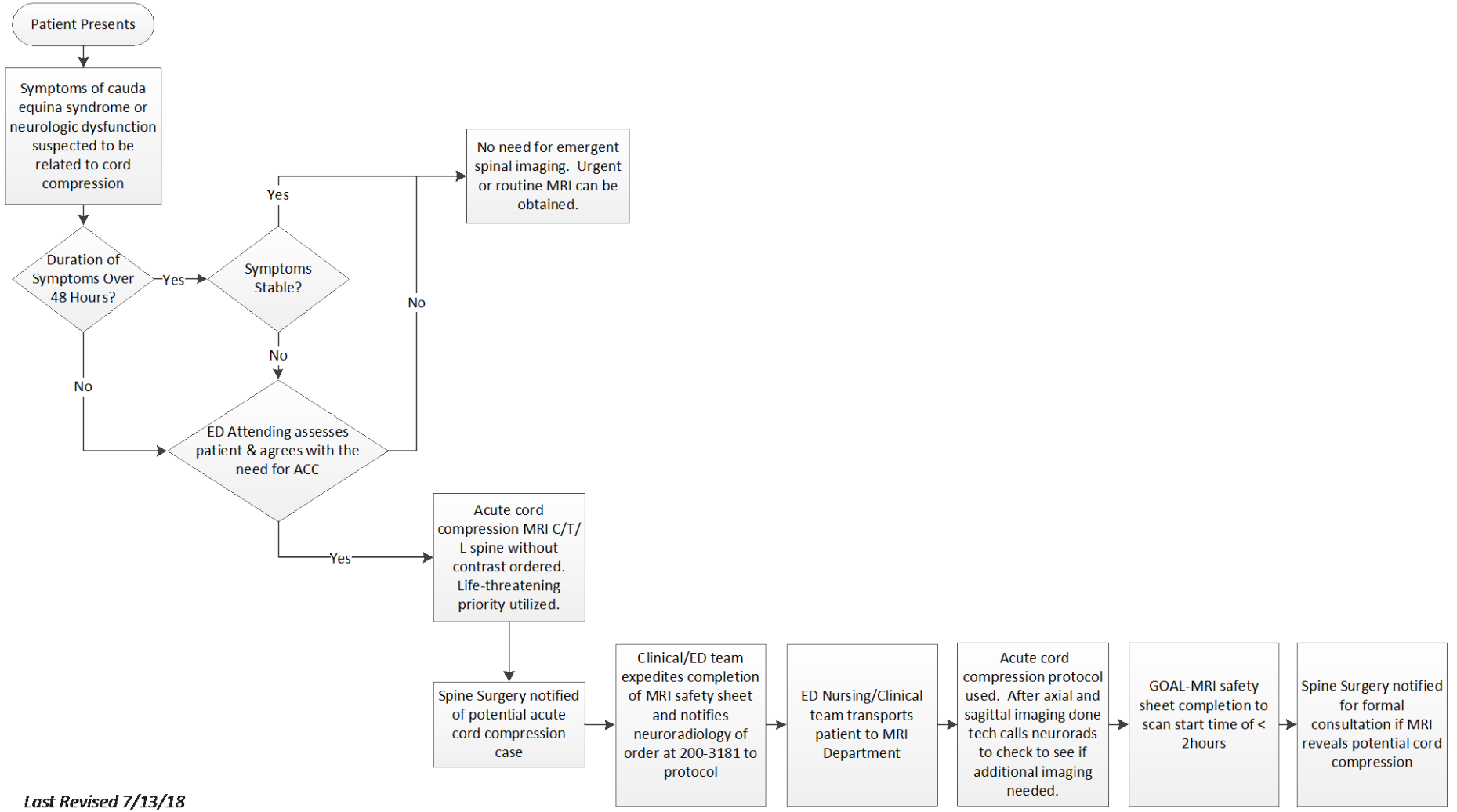
- **Reduced order placement to scan begin time by 47%** (from 255 minutes to 124 minutes)
- **Reduced total scan time by 50%** (from 54 to 27 minutes)

Sustainability Plan:

Quarterly review of exams ordered with ACC and goal metrics

NEW PROCESS MAP CREATED BY RADIOLOGY, ED, AND SPINE SURGERY

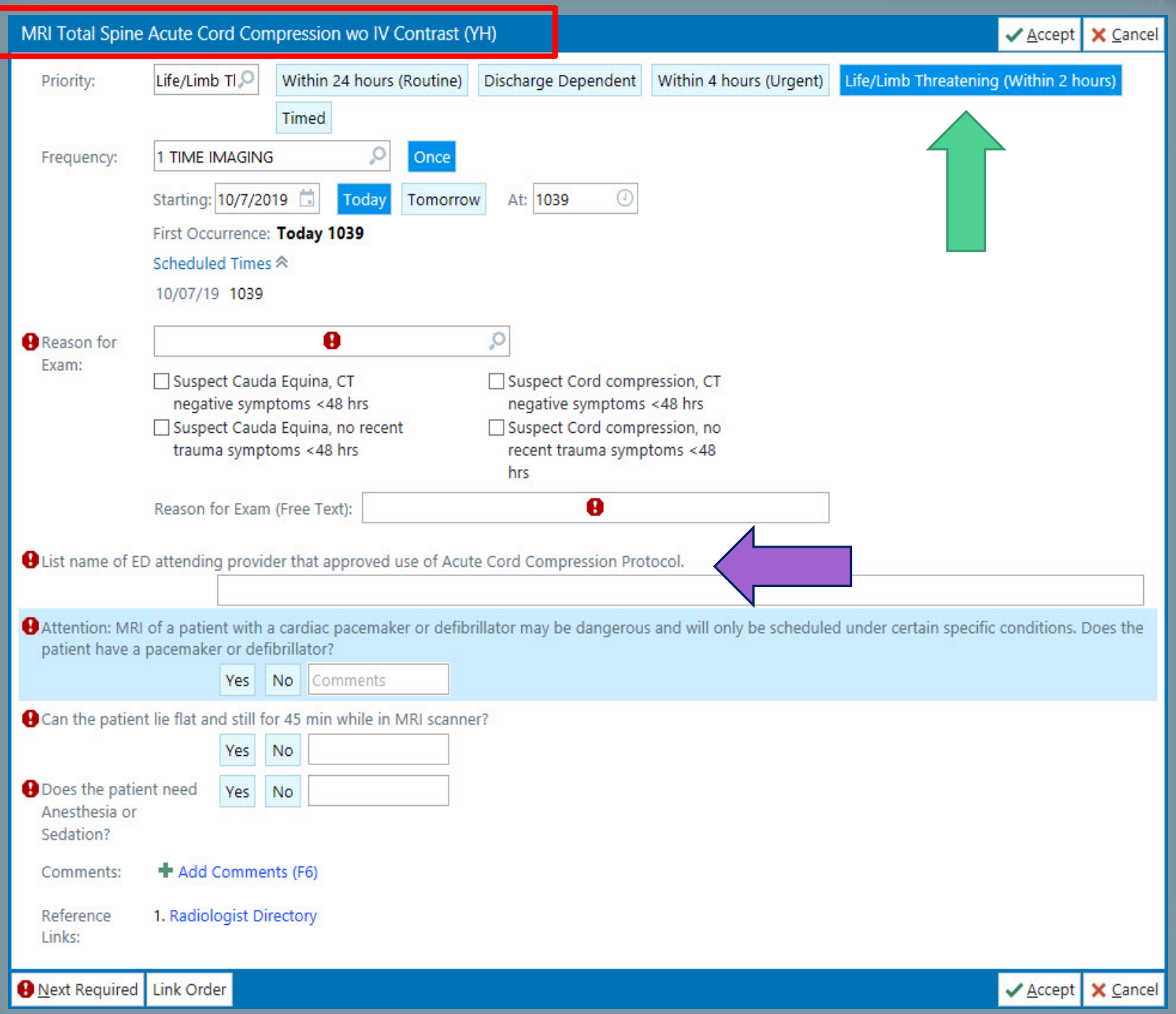
Acute Cord Compression (ACC) Protocol



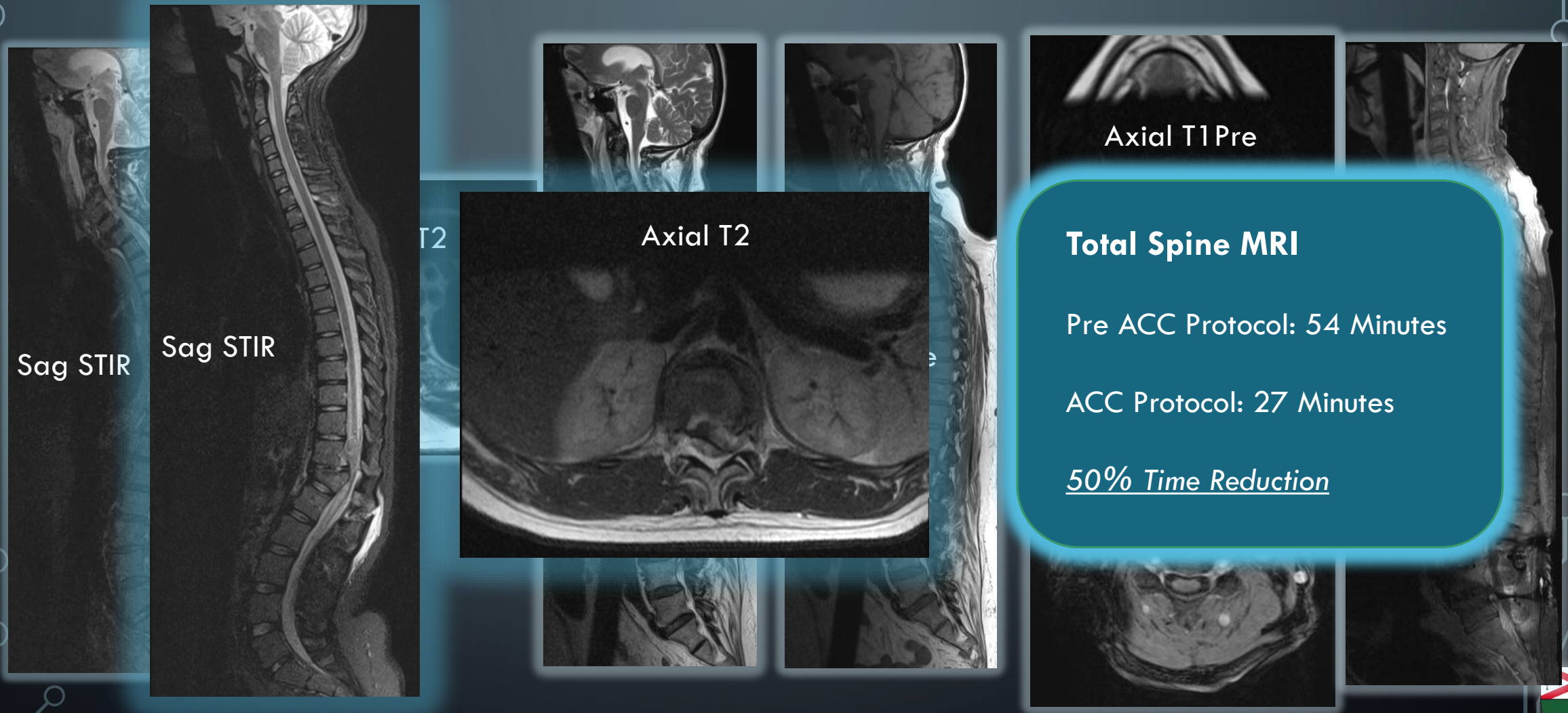
Last Revised 7/13/18

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)



ACC PROTOCOL FOR TOTAL SPINE MRI



Total Spine MRI

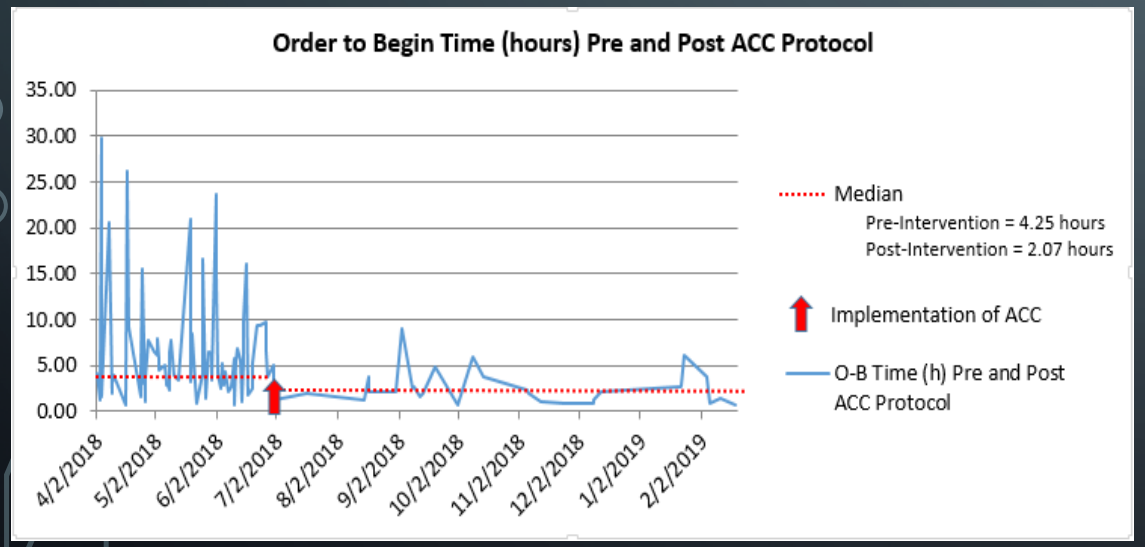
Pre ACC Protocol: 54 Minutes

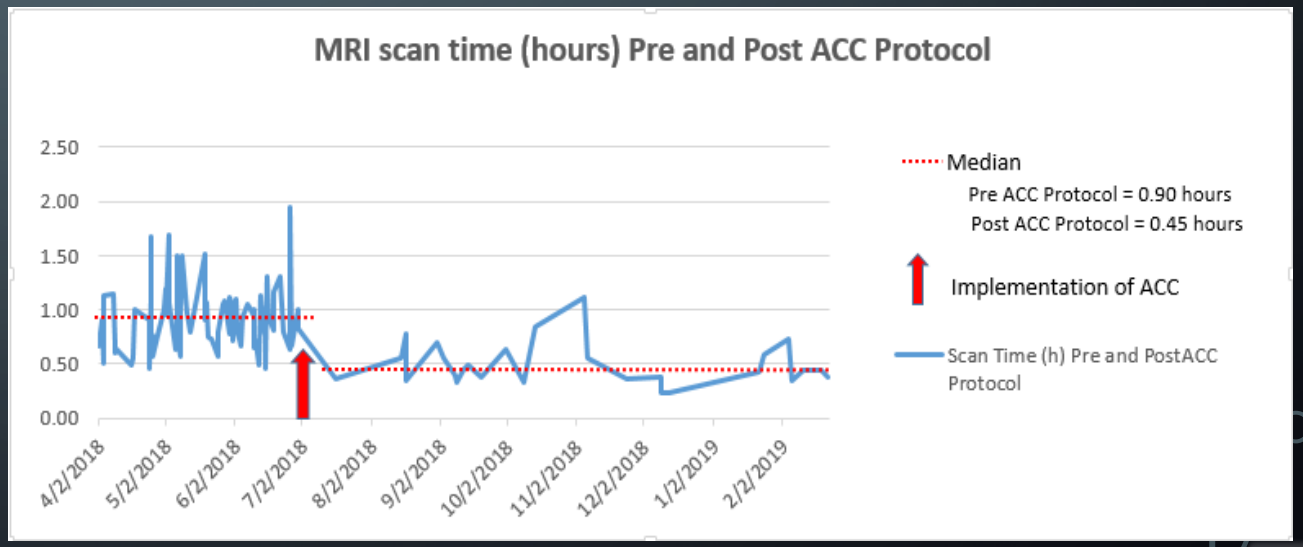
ACC Protocol: 27 Minutes

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).





CONCLUSION

- 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