

Evaluation of Inpatient Neuro MRI Utilization for work-up of CVA at a Community Hospital

Isabella Hamilton, DO and Joseph Waller, MD

OBJECTIVE

To evaluate the appropriateness of inpatient neuro MRI studies at Wilmington Hospital from January to March 2025, with the goal of identifying opportunities to reduce unnecessary imaging and improve ordering practices.

INTRODUCTION

From 1999-2008, MRI utilization among stroke patients per a study including 624,842 patients increased 235%, from 28% to 66%. These MRI scans have been the fastest growing component of hospitalization costs for stroke patients [1]. In one study of patients with minor neurological symptoms, MRI scans demonstrated evidence of acute ischemia in only 13-31% of cases. This reflects that for some, MRI scans may be low-yield and don't demonstrate actionable findings [2].

The Chief Medical Officer (CMO) for Wilmington Hospital, a 321-bed facility in Wilmington, DE, and part of the ChristianaCare system, wanted to evaluate potential inappropriate imaging in the inpatient setting.

METHODS

General: This retrospective quality improvement (QI) project used a Plan-Do-Study-Act framework to evaluate the appropriateness of inpatient neuro MRI utilization for suspected CVA and identify opportunities to improve imaging stewardship.

Quality Improvement Team: The team included two radiology residents, an attending neuroradiologist, the CMO of Wilmington hospital, Chair of Diagnostic Radiology and EMR/data support personnel.

Study of the Intervention: At Wilmington Hospital an initial data pull of inpatient MRI brain and MRA head/neck studies ordered for suspected stroke were identified between January - March 2025. Then a retrospective chart review assessed imaging indications, clinical documentation, prior vascular imaging, and radiology reports to categorize studies as Usually Appropriate, May Be Appropriate, or Usually Not Appropriate. These reports were categorized referencing the 2024 American College of Radiology (ACR) Appropriateness Use Criteria and neuroradiologist consensus.

Measures/Metrics: Primary measures were the rate of potentially not appropriate imaging (which included both "may be appropriate" and "usually not appropriate" imaging categories) and the acute positive imaging rate (acute ischemia or other clinically relevant acute findings); secondary measures included contrast utilization without clear indication and yield stratified by clinical presentation.

Analysis: Descriptive statistics were used to calculate frequencies and subgroup yield, with qualitative review of ordering patterns to identify drivers of low-yield imaging and assess variation across the study period.

RESULTS

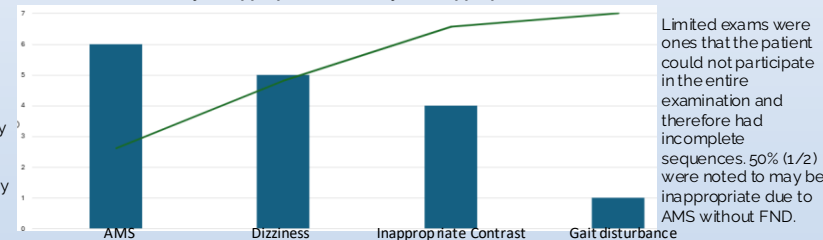
After review of the 113 included MRI studies, **16% (18 studies) were either may be appropriate (12) or usually not appropriate (6).**

Exams were also assessed for acute findings. After review, **42/113 MRIs were positive (~37%) for an acute finding.**

"May Be Appropriate" or "Usually Not Appropriate" MRI Examinations	
# of Exams	Explanation of Categorization
6	Altered Mental Status (AMS) without Focal Neurologic Deficit (FND)
5	Nonspecific Dizziness without central vertigo or cerebellar ataxia
4	Received contrast without a clear indication
1	Gait ataxia with known explanation

Two specific examination types were found to have high rates of potentially not appropriate imaging orders, which were MRI brain with and without contrast and limited MRI brains.

May Be Appropriate & Usually Note Appropriate



Only 6 contrast examinations were included in total (4 MRI brain with and without and 2 MRA Head/neck with) with 4 deemed **usually not appropriate (67%) due to unnecessary contrast administration.**

Surprisingly, having a **neurologic consult did not reduce the rate of possibly inappropriate studies.** When specifically looking at studies deemed usually not appropriate, neurology was more often consulted.

Overall, the following categorized reasons for MRI examinations being deemed may be appropriate and usually not appropriate were consolidated into the pareto chart below.

CONCLUSION

16% of inpatient neuro MRIs were potentially inappropriate, with lower yield observed in patients without focal neurologic deficits and in cases of nonspecific dizziness or AMS.

Limitations: single-center retrospective design, short study period, and reliance on documentation quality without direct assessment of management impact.

Discussion of Interventions: Long-term impact will depend on EMR-based decision support, continued provider feedback, and periodic reassessment of appropriateness rates. After review of results, potential interventions include provider education, EMR decision support, and contrast protocol standardization.

Conclusions: 16% of studies were possibly not appropriate, and neurologic consult did not prevent potentially inappropriate imaging.

References

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