Get with the Guidelines on MS imaging by Leveraging Peer Learning

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BACKGROUND

Cases reviewed in our Peer Learning program revealed an opportunity for improved imaging and interpretation of MRI performed for assessment of multiple sclerosis (MS). Using the 2021 MAGNIMS-CMSC-NAIMS consensus criteria, we embarked on a quality improvement process to standardize imaging to the extent possible in sync with current practice guidelines.

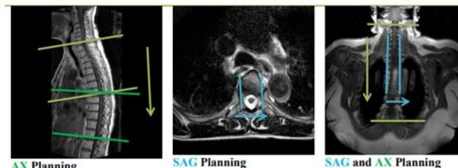
METHOD

We leveraged our CME-accredited Peer Learning conferences to drive quality improvement in MRI imaging along with feedback from the neurology service. Using a Plan-Do-Study-Act (PDSA) model, we incorporated recommendations on MRI protocol standardization, the judicious use of gadolinium, and standardized reporting. A dedicated 3T brain protocol was developed, including a DIR sequence to increase conspicuity of cortical lesions and hi-resolution SWI imaging for detection of a central vein sign. For routine MS brain and spine imaging, we optimized and standardized imaging sequences across scanners (Fig 1). For imaging reporting, we developed a standardized dictation template (Fig 2). Feedback was collected from neuroradiologists and neurologists.

N43 Thoracic Spine for MS

Weight based dose gadolinium follow dosing guidelines in MRI Gadolinium Policy MR_36

- If needed Start Peripheral line
- When planning the study observe the below angles
- NO pre-contrast T1 imaging for MS study unless it's requested by a radiologist



Scan list

• LOC (consider additional COR loc to for an accurate planning)		
• C+ SAG T2, 2 mm / 0.2 • C+ SAG STIR, 2 mm / 0.2 • C+ SAG T1, 2 mm / 0.2	Cover the spinal cord only. Avoid excessive coverage. 11-13 slices should be sufficient Cover from C7 to include conus (L1-L2) level	If the patient is having a C-spine at the same time the FOV for the T-spine should start where the FOV for the C-spine ended. Minimum overlap with the C-spine
• C+ AX upper T2, 3 mm / 0.3 • C+ AX lower T2, 3 mm / 0.3	Cover from C7 to include conus (L1-L2) level	**If the patient is having a C-spine at the same time the slices for the T-spine should start where the slices for the C-spine ended.** (not necessarily at the C7 level)

Fig 1: New MS Thoracic Spine MRI protocol

INDICATION:

[]

FINDINGS:

WHITE MATTER LESIONS: [if < 20, please count. Otherwise, 20- 50; 50 – 100; >100; or confluent.]

LOCATION: [Periventricular, subcortical/juxtacortical, brainstem, proximal cervical spinal cord.]

[LESIONS CONTAINING CENTRAL VEIN SIGN:] [Yes/No. How many?]

[CORTICAL LESIONS:] [Yes/No. How many?]

[OPTIC NERVES:] [Presence or absence of signal abnormality.]

} Optional

NEW LESIONS: [None, or note individual lesions.]

ENHANCING LESION: [None, or note individual lesions.]

BLACK HOLES: [None, a few, several; must be CSF signal intensity.]

ATROPHY: [None or if present mild/moderate/severe since date of prior.]

CORPUS CALLOSUM: [No/mild/moderate/severe thinning.]

BRAIN/EXTRAAXIAL:
[There is no evidence of acute infarction, extra-axial collection, mass effect or hydrocephalus.]

[The ventricles sulci and cisterns appear proportional and age appropriate.]

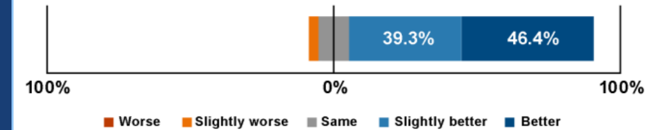
[The major vascular flow voids are preserved.]

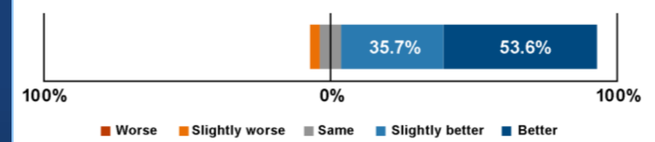
BONES/EXTRACRANIAL SOFT TISSUES: []

IMPRESSION:

[Stable exam. No evidence of new, progressive disease, or active demyelination.]

Fig 2: Dictation template for MRI Brain, MS protocol





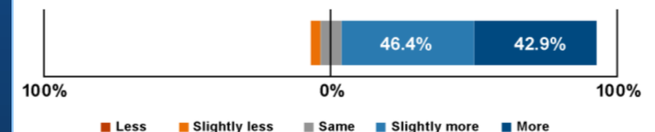


Fig 3: Survey responses

RESULTS

We collected feedback via survey from 7 neuroradiologists and 1 neurologist on overall imaging quality, conspicuity of individual lesions, and confidence in lesion detection using a 5-part Likert scale. Regarding the new protocol, 85.7% preferred the image quality, 89.3% agreed lesions were more conspicuous, and 89.3% expressed increased confidence in lesion detection (Fig 3). 89% of responses favored the new protocol both for MS diagnosis and surveillance.

CONCLUSION

By leveraging the Peer Learning Conference methodology, we were able to achieve consensus on the performance, interpretation, and reporting of MS imaging. Practices can likely benefit from a format to discuss timing and technique for incorporation of these algorithms.

REFERENCES

1. Wattjes MP, Ciccarelli O, Reich DS, et al.; North American Imaging in Multiple Sclerosis Cooperative MRI guidelines working group. 2021 MAGNIMS-CMSC-NAIMS consensus recommendations on the use of MRI in patients with multiple sclerosis. Lancet Neurol. 2021 Aug;20(8):653-670. doi: 10.1016/S1474-4422(21)00095-8. Epub 2021 Jun 14. PMID: 34139157.
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3. Donnelly LF, Larson DB, III RE, Kruskal JB. Practical suggestions on how to move from peer review to peer learning. American Journal of Roentgenology. 2018 Mar;210(3):578-82.