

Repeat MRI of the Spine within 90 days: Assessment of a Single Academic Center

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INTRODUCTION: Unnecessary magnetic resonance imaging (MRI) can lead to increased cost, inappropriate treatment, and patient anxiety.¹ The incidence of inappropriate MRI studies can be upwards of 59%.² This study seeks to identify and assess repeat MRIs within 90 days. We aim to evaluate the characteristics of repeat imaging studies and examine for change in surgical patient care.

METHODS: A retrospective review of spine MRIs at a single institution between January 1, 2019, and January 1, 2022 was completed. Inclusion criteria were any pathology, age > 18, and repeat MRI of the same location within 90 days. Exclusion criteria were repeat MRI not within 90 days and repeat MRI with contrast when original was without. Outcome measurements included demographics, image location and indication, ordering physician specialty, and surgical intervention within 90 days. Chi-squared statistical analysis was utilized for categorical variables and student's t-test was utilized for continuous variables. Statistical significance was set at $p < 0.05$.

RESULTS SECTION: The original cohort included 10,754 spine MRIs, 3,997 patients. 8,848 MRIs and 2,405 patients were excluded and served as comparison. 1,906 repeated MRIs and 592 patients were included. The repeat MRI cohort had a statistically significant decrease in percentage of females (46.06% vs. 53.60%, $p < 0.001$). Indications for repeat imaging included infection (34.73%), oncology/inflammatory (27.18%), trauma/fracture (5.56%), pain (16.79%), neurologic change (13.54%), and cerebral spinal fluid (CSF) leak (2.20%). Spine MRIs which were completed both with and without contrast were more likely to be repeated ($p < 0.00001$). Rate of repeat MRIs varied by specialty (orthopedic surgery-9.02%; neurosurgery-28.44%; emergency medicine-11.65%, and medicine-38.72%). Of 953 repeated MRIs, 98 (10.28%) underwent operative intervention within 90 days. Operative intervention following repeat imaging varied by specialty (orthopedic surgery-39.53%; neurosurgery-11.81%; emergency medicine-13.51%; and medicine-4.34%) and indication (infection-2.42%; oncology/inflammatory-3.86%; trauma/fracture-20.75%; pain-16.88%; neurologic change-32.56%; and CSF leak-0.00%).

DISCUSSION: At a single institution, females were less likely to have repeat spine imaging and MRI both with and without contrast was more frequently repeated. Infection and oncologic/inflammatory processes more frequently had repeat imaging, however, were less likely to undergo operative intervention compared to trauma/fracture, pain, and change in neurologic exam indications. Although medicine teams more frequently ordered repeat imaging, patients were less likely to undergo operative intervention when compared to orthopedic surgery, neurosurgery, and emergency medicine. Our limitations included the retrospective nature of the study and inability to adequately assess change in non-operative care.

SIGNIFICANCE/CLINICAL RELEVANCE: Unnecessary MRIs are currently wasting an estimated \$300 million to \$1.2 billion in healthcare costs per year.^{3,4} Our study identifies indications, MRI study characteristics, and ordering physician specialties which may be risk factors for increased costs and can be addressed with quality improvement protocols moving forward.

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