Engaging MRI Technologists in Knowledge-Based Protocoling of MRI Studies: Can MRI Technologists Perform This Task Similar to Radiology Residents?

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Background

- Workflow in our body MR division relies primarily on second-year through fourth-year (R2-R4) radiology residents to protocol MRI studies under the direct supervision of attending radiologists.

- Problems arise when the service is staffed by a single first-year resident (R1) or R2 without prior exposure to MRI. Another problem that we observed is our residents can spend a considerable amount of time on the phone clarifying orders with outside providers, thus taking away time from development of interpretative skills.

Purpose

- The purpose of our project is to assess whether MRI technologists can protocol body MRI studies at a level equivalent to radiology residents (R2-R4) with adequate education.

- Our ultimate goal is to optimize patient care by cross-training MRI technologists as an added layer of oversight to our residents, and promote seamless collaboration between technologists, radiology residents, and attending radiologists.

Methods

1 Questionnaire administered (via Qualtrics) to all full-time MRI technologists.

- Questionnaire was comprised of 8 different hypothetical imaging scenarios which are commonly encountered in the abdomen/pelvis at our institution.
- Responses were recorded in free text format (without character limit).

2 Conducted educational "lunch and learn" session reviewing body MRI protocols with MRI technologists.

- Session led by the chief MRI technologist & chief body MRI radiologist.
- Problem solving skills were promoted by discussing case scenarios.
- All full-time MRI technologists attended the session.

Methods

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After the educational session, technologists began to document their MRI protocol recommendations in a "tech notes" section of our electronic medical record (EMR).

Residents concurrently documented their MRI protocol recommendations.

- Residents and technologists were blinded to each others' protocol recommendations.
- Both technologists and residents had full access to the EMR while determining protocols.
- Data collection period spanned 6 months (March 5, 2020 - September 5, 2020).

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An attending radiologist with primary practice in abdominal imaging was the gold-standard in determining the appropriate protocols.

Pre-Intervention Results:

- The questionnaire response rate by full-time MRI technologists was 70% (7 of 10 technologists).

- Before the educational session was delivered, technologists responded to the 8 hypothetical imaging scenarios correctly 93% of the time (52 times out of 56).

- Before the educational session was delivered, technologists referred to the patient's EMR 23% of the time (13 times out of 56).

Post-Intervention Results:

- Total number of cases reviewed: 172
  - Cases excluded based on documented discussion between attending/resident: 12

- After the educational session was delivered, technologists recommended the correct protocol 98% of the time (157 cases out of 160 cases)

- After the educational session was delivered, technologists referred to the patient's EMR 64% of the time (102 cases out of 160 cases).

Appropriate Protocol Recommendations
MRI Technologists vs. Senior Radiology Residents

Percentage of Cases with Appropriate Protocol Recommendation
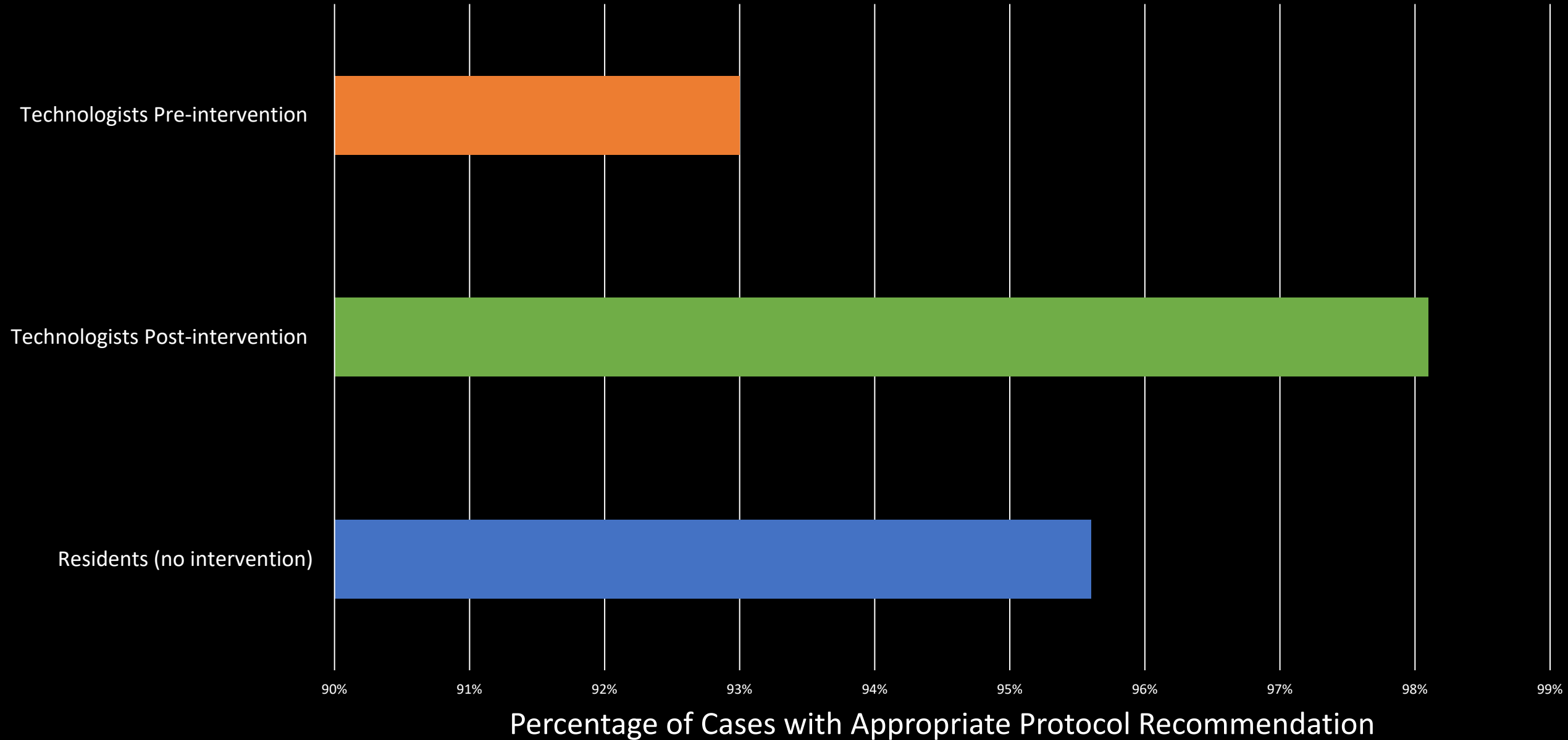
Statistical Analysis

- Using Fisher's exact test, the difference in performance of our technologists correctly protocolling studies pre- and post-intervention (93% vs. 98%) was determined to be statistically non-significant at a 5% level (p=0.0761).

- Using a chi-squared test, the difference in frequency of technologists utilizing the patient's EMR while determining correct protocols pre- and post-intervention (23% vs. 64%) was determined to be statistically significant at a 5% level (p<0.0001).

- Using McNemar's test, the difference in performance between technologists (post-intervention) and residents (98% vs. 96%) was not statistically significant at a 5% level (p=0.3437).
  - There were 3 cases where a technologist recommended the incorrect protocol and a resident recommended the correct protocol.
  - There were 7 cases where a technologist recommended the correct protocol and a resident recommended the incorrect protocol.

Conclusions

- We show that with adequate education, MRI technologists are capable and competent in protocoling MRI studies at a level equivalent to radiology residents.

- Incorporating technologists to work alongside radiology residents in protocoling studies can enhance patient care by reducing callback rates and may simultaneously increase diagnostic accuracy of radiologists by performing the most appropriate studies.