Predictors of Academic Radiology Subspecialization

An Analysis of Medicare Claims Data
Authors

1. Lohith G. Kini, MD, PhD
2. Peter N. Hadar, MD, MS
3. Evan Calabrese, MD, PhD
4. Brian Trinh, MD
5. Brian Haas, MD

- UCSF, Radiology Resident
- Penn, Neurology Resident
- UCSF, Neuroradiology Fellow
- UCSF, Neuroradiology Fellow
- UCSF, Assistant Professor, Radiology

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Purpose

Healthcare is moving away from a fee-for-service to a performance-based model.

- CMS has worked with radiology subspecialty societies to expand their performance metrics, but this is limited by metrics that are meaningful and relevant to radiology.

A promising area is the degree of specialization of radiology practices.

- Radiologists receive subspecialty fellowship training and develop specialty practice patterns, presumably because such specialization results in higher quality reads.

We used publicly available Medicare claims data to ascertain a radiologist’s field of expertise and the appropriateness of their specialty reads.
Materials & Methods

• Using the 2015 Medicare Provider Utilization and Payment Data and the ACR’s Neiman Imaging Types of Service (NITOS) system, we classified the work RVUs each radiologist interpreted within different subspecialties.

• Additionally, we designated certain CPT codes as advanced imaging, which consisted of the most complex subspecialty examinations.

• We determined radiologist subspecializations of the top 20 NIH-funded radiology departments (Rosenkrantz, 2017).

• Using python’s sklearn library, we then identified features that could determine subspecialty classification.
Results

• We predict radiology specialization both by RVU proportion for advanced specialty imaging relative to overall specialty imaging and RVU fraction for specialty imaging relative to overall imaging.
Results: Figure 1

- Figure 1 shows advanced specialty imaging RVUs proportion in a respective radiologist’s specialty and associated radiologist specialization.

**Figure 1: RVU Distribution of Advanced Imaging by Specialty.** For each specialized radiologist, determined from recording top 20 NIH-funded radiology departments, we determined the extent of fraction of advanced specialty imaging RVUs to overall specialty imaging RVUs for each specialized radiologist.
Results:

Figure 2

- Figure 2 shows a subset analysis, in which the fraction of musculoskeletal imaging reads relative to overall reads by every radiologist was highest amongst musculoskeletal-specialized radiologists (F-score of 231.0, p-value < 0.01).

Figure 2: Fraction of Musculoskeletal Imaging RVUs by Radiologist Specialty. This is a sample feature that was detected in our machine learning analysis: The fraction of RVUs derived from musculoskeletal imaging compared to overall imaging reads was classified by radiologist specialty, derived from the top 20 NIH-funded radiology department data. The extent of musculoskeletal imaging reads was statistically significant in detecting musculoskeletal-specialized radiologists, with an F-statistic was 231.0 and p-value<0.01.
Conclusions

• We detected differences in the proportion of advanced specialty imaging read by specialized radiologists and could predict a radiologist’s specialization based on the proportion of specialty imaging read.

• This categorization method can be used to classify non-academic radiology specialties for further analysis into Medicare claims data, including differences in geography, practice size, and scope of practice.