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# Osteopathic (DO) vs. Allopathic (MD) Radiologist Workforce Composition and Characteristics

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# Disclosures

- Dr. Duszak, Dr. Hughes, and Mr. Santavicca receive unrelated grant support from the Harvey L. Neiman Health Policy Institute.
- The authors declare that they had full access to all of the data in this study and take responsibility for the integrity of the data and the accuracy of the data analysis.



# Background

- As demand for medical imaging has grown over time [1], recent attention has focused on the subspecialty and geographic composition of the U.S. radiologist workforce [2,3]
- With an overwhelming majority of radiology residents now pursuing fellowships [4] and radiology groups becoming larger and more consolidated [5], the radiologist workforce is becoming increasingly subspecialized [6]
- While that subspecialization can improve patient care [7], it may also create patient access gaps [6]
- This concern has led to recent calls for more general and rural radiologists [6]



# Background

- Although most U.S. physicians are educated at allopathic medical schools, osteopathic medical school enrollment is increasing, with osteopaths representing a faster growing component of the physician workforce [8,9]
- Historically, osteopathic physicians have disproportionately practiced in primary care and rural areas [9-11], but the number pursuing training in specialties outside of primary care is increasing [9,12]
- Although osteopaths represent a small portion of the overall radiologist workforce, they have long been engaged in the specialty [13], expanding care diversity through their training in the promotion of the body's natural tendency towards self-healing and health [14,15]



# Methods

## Identification of Osteopathic and Allopathic Radiologists

- Using Centers for Medicare and Medicaid Services (CMS) Physician and Other Suppliers Public Use Files (POSPUF) we identified all physicians who
  - self-reported their primary specialty as diagnostic radiology, interventional radiology, or nuclear medicine (together “radiologists”)
  - self-reported their medical school credentials as either Doctor of Medicine (MD) or Doctor of Osteopathic Medicine (DO)
- Then, using each physician’s unique National Provider Identifier we linked them to separate CMS Doctors and Clinicians Initiative (formerly Physician Compare) databases
  - We extracted the following information for those residing in the 50 states and District of Columbia who billed services to Medicare from 2014 through 2019:
    - affiliated group practice ID
    - number of organization members
    - billing location (state, zip code)
    - self-reported gender (reported by CMS in a binary fashion as male or female)
    - and medical school graduation year



# Methods

## Characterization of Osteopathic and Allopathic Radiologists

- Consistent with methods used in earlier investigations [16,17], years of practice since training was estimated for each radiologist by calculating the number of years since graduating medical school less the typical 6-year internship through fellowship training period
- Next, following an approach validated in both academic and private practices [18,19], and used in recent studies [3,6,16,20,21], we used CMS POSPUF to classify radiologists as generalists or subspecialists
- This approach classifies radiologists as subspecialists if greater than 50% of their reported work relative value units are clinical services associated with a specific subspecialty [18,19]
- We further classified subspecialists in that manner so previously described (abdominal, breast, cardiothoracic, musculoskeletal, neuroradiology, nuclear medicine, and interventional)



# Methods

## Characterization of Osteopathic and Allopathic Radiologist Practices

- Radiologists' primary billing locations were mapped
  - 1) to U.S. Census regions based on their primary states of practice
  - 2) as either urban or rural using the Census tract-based Rural-Urban Commuting Area (RUCA) classification scheme, with urban defined by RUCA codes corresponding to a metropolitan area core or metropolitan area with high commuting
- Consistent with previous studies [16,22,23], we grouped each practice size by the number of employed or affiliated physicians as follows: 1 to 9, 10 to 49, 50 to 99, and  $\geq 100$
- Also consistent with an earlier investigation [16], an academic assignment was made for each practice included in the Harvey L. Neiman Health Policy Institute Academic Radiology Practices list [22,24], if the practice name included the following words or text strings: "univ," "faculty," "college," or "school"
  - Remaining practices were classified as non-academic
- Finally, in a manner recently described [21], each practice was labeled as either "radiology-only" or "multispecialty"

- Radiologists whose primary group practice was not uniquely identifiable (e.g., affiliation with multiple distinct practices or with multiple practice IDs which effectively compose a singular parent organization) were assigned to their largest practice by number of organization members.
- Similarly, if a radiologist was affiliated with multiple zip codes for a single practice, the zip code with the highest 2010 Census population was assigned.



# Methods

- Only complete observations (97.6% of all observations for physicians self-reporting degrees) were considered in our regression analysis
- Radiologist-years: 83,315 included in the regression

## Outcome variable

Osteopathic degree indicator

- Dichotomous – 0 or 1

## Covariate measures

### Continuous

- Years of practice since training

### Categorical or Binary

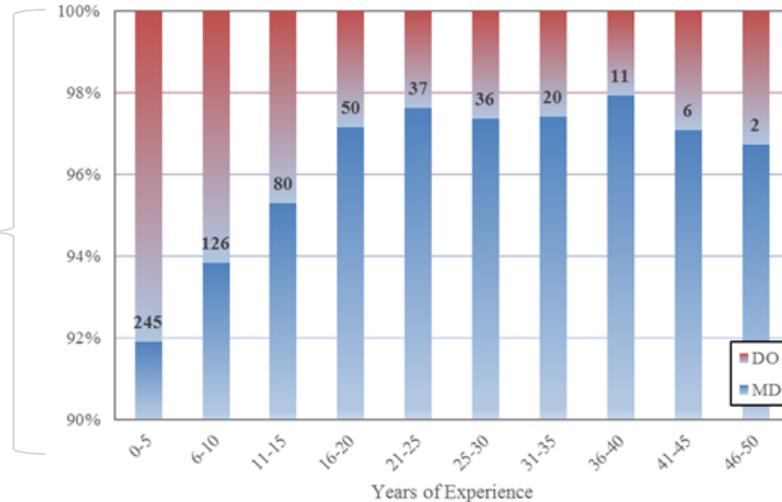
- Radiology-only (vs. multispecialty) group indicator
- Academic (vs. non-academic) group indicator
- Practice size
- Census region
- Urban (vs. rural) indicator
- Male (vs. female) gender indicator
- Subspecialty (vs. generalist) indicator

We used a generalized estimating equations-based **logistic regression model** with robust standard errors controlling for influential covariates and annual fixed effects **to estimate odds ratios** of associations between various physician and practice characteristics of interest and **radiologists' medical school degrees**

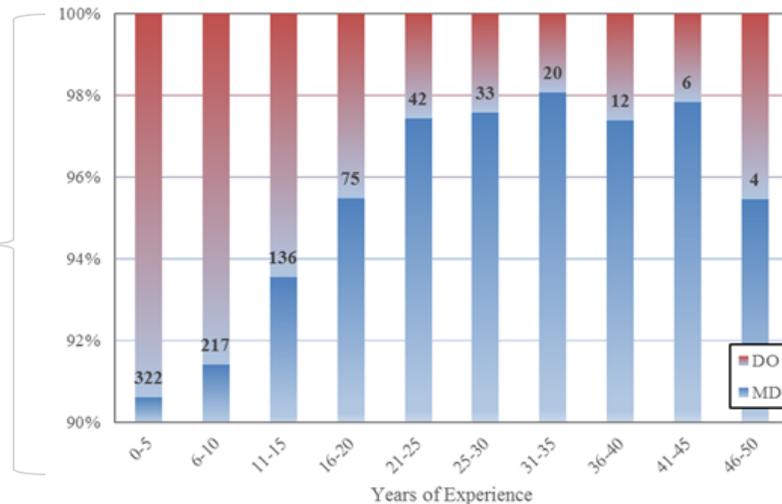


# Results

2014



2019



- Between 2014 and 2019, we identified a total of 38,123 physicians in POSPUF self-reporting their specialty as radiology (30,408 in 2014 and 32,703 in 2019)
- Of these, 17,913 (47.0%) self-reported their medical degree (1,026 [5.7%] as DO and 16,887 [94.3%] as MD)

- The osteopathic share of the radiologist workforce was greatest for those with fewer years of practice
- Of all osteopathic radiologists, 40.0% in 2014 and 37.1% in 2019 had 5 or fewer years of post-training experience
- Of all osteopathic radiologists, 73.6% in 2014 and 77.8% in 2019 had 15 or fewer years of experience
- That distribution became more pronounced, with the number of osteopaths decreasing from 245 (8.1% of all radiologists) with five or less years of experience in 2014 and 322 (9.4%) in 2019 to 2 (3.3%) with 46 to 50 years of experience in 2014 and 4 (4.5%) in 2019

Note: Bar labels represent the number of osteopathic radiologists in each time window



# Results

## Independent **negative** predictors of osteopathic (vs. allopathic) radiologists:

### Subspecialization

Practice as a subspecialty radiologist (range of OR=0.369 for nuclear medicine to OR=0.787 for neuroradiology, all  $p < 0.01$ ), except for cardiothoracic imaging (not statistically significant)

### Later career stage

For each year since completing training radiologists were 3.7% less likely have DO degrees (OR=0.936 per year,  $p < 0.01$ )

### Urban areas of practice

DOs were less likely to work in urban areas (OR=0.964,  $p < 0.01$ )

### Regions outside of the Midwest

Compared to the Midwest, DOs were less likely to work in the Northeast (OR=0.964), South (OR=0.950), and West (OR=0.942) (all  $p < 0.01$ )

DO	OR	95% CI	P>z
Radiology-only group (vs. multispecialty)	0.997	(0.994, 1.001)	.164
Academic practice (vs. non-academic)	1.001	(0.995, 1.008)	.683
Practice size (reference: 1-9 radiologists)			
10-49 radiologists	0.997	(0.987, 1.007)	.527
50-99 radiologists	0.996	(0.986, 1.007)	.492
100+ radiologists	0.998	(0.988, 1.008)	.689
Region (reference: Midwest)			
Northeast	0.964	(0.942, 0.987)	.002
South	0.950	(0.931, 0.970)	< .001
West	0.942	(0.923, 0.962)	< .001
Urban location (vs. rural)	0.946	(0.908, 0.986)	.009
Self-identified male gender (vs. female)	0.954	(0.858, 1.061)	.384
Years of practice since training (years)	0.963	(0.956, 0.970)	< .001
Subspecialty (reference: general radiology)			
Abdominal imaging	0.460	(0.346, 0.610)	< .001
Breast imaging	0.642	(0.491, 0.840)	.001
Cardiothoracic imaging	0.787	(0.527, 1.173)	.239
Musculoskeletal imaging	0.407	(0.269, 0.617)	< .001
Neuroradiology	0.652	(0.523, 0.812)	< .001
Nuclear medicine	0.369	(0.181, 0.751)	.006
Interventional radiology	0.492	(0.359, 0.675)	< .001
Calendar year (reference: 2014)			
2015	1.038	(1.03, 1.046)	< .001
2016	1.079	(1.063, 1.095)	< .001
2017	1.121	(1.097, 1.146)	< .001
2018	1.165	(1.132, 1.199)	< .001
2019	1.211	(1.168, 1.255)	< .001



# Discussion

- Unsurprising to our team were our findings that osteopathic radiologists were more likely to practice in general radiology and in rural communities
  - With a stated emphasis in primary care and rural health [25], osteopathic medical schools account for nine and four out of the 10 top programs with the most graduates practicing in primary care and in medically underserved areas, respectively, and three of the top five ranked schools with the most graduates practicing in rural areas [26]
  - Another explanation for the higher relative density of osteopathic radiologists in rural areas is that they tend to remain in or near the communities where they complete their education and training [27]
  - Because many colleges of osteopathic medicine are located in medically underserved areas, osteopathic physicians are more likely to provide care in communities with limited access to medical care [11].
  - The greater density of general radiologists also is likely explained in large part by the persistent shortage of primary care providers in the rural U.S. [11]; extending to a coverage demand best met by radiologists with general and common service skill set
- Also expected was the revelation that the number of osteopathic radiologists outgrew that of allopathic radiologists by a fair margin (3.8 times larger percentage growth)
  - The data suggest that osteopathic medicine has been growing quite substantially for decades, with two-thirds of actively practicing osteopaths (more than 78,000 physicians) under the age of 45 [8,9,28]
  - Although osteopathic radiologists in our sample represented 6% of all radiologists in 2019, and in the U.S. represented 11% of all licensed physicians, 26% of medical students in the U.S. currently attend an osteopathic medical school [28]



# Discussion

- In an effort to integrate allopathic and osteopathic training pathways at the graduate level into a single accreditation system the Accreditation Council for Graduate Medical Education began accrediting American Osteopathic Association training programs in 2020 [29]
- With osteopathic medical students now participating in the National Resident Matching Program and increasingly choosing to specialize outside of primary care [10,11], it is likely that radiology will continue to see an influx of physicians with osteopathic degrees
- Greater diversity in this context presents several appealing opportunities for improved patient care.
  - For instance, newly integrated residency programs may encourage osteopathic and allopathic radiology residents alike to better understand the importance of general and rural coverage
  - While historically there has been an emphasis on subspecialty training, this potentially leaves patients in rural areas (about 1 in 6 of U.S. population) disadvantaged with regard to geographic access
  - Although diagnostic imaging can be covered remotely, interventional radiology cannot. Minor procedures are most common [3] and so more general, rather than dedicated interventional, radiologists in these areas may help meet these access needs
- For these reasons, as the osteopathic radiologist workforce grows, this group may be particularly helpful in filling these gaps in patient access to care



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Thank you for your time! Please contact Stefan Santavicca with any questions.