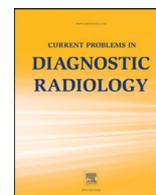




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In Pursuit of Fellowship: Results From a 2016 Survey of US Trainees

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ABSTRACT

Purpose: The purpose of this study was to gauge radiology trainee perceptions regarding the fellowship selection process and survey their perceived level of preparedness and desire for a fellowship-oriented lecture.

Methods: A survey, approved by Association of Program Coordinators in Radiology (APCR) was distributed via e-mail to all APCR members for distribution to their residents.

Results: A total of 98.6% ($n = 261$) of residents plan to pursue a fellowship. The most popular fellowships are interventional radiology, body, musculoskeletal, and Neuro. For fellowship information, residents believe that fellowship directors in their field of intent were the most reliable (76%), followed by fellows (65%). Only approximately 50% of residents felt somewhat strongly that they were preparing for their fellowship application correctly. Lastly, 44% of residents ($n = 94$) replied extremely likely to attend a lecture series given by fellowship directors, and 36% ($n = 77$) said somewhat likely.

Conclusion: This survey demonstrates that most trainees plan to pursue fellowship training. Residents ranked certain resources as more important in fellowship selection, such as fellowship directors and fellows. Lastly, there is a high interest in a lecture series that would bring together fellowship directors and residents that are interested in that particular fellowship.

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Introduction

The percentage of residents subspecializing has changed dramatically in recent times. Toward the end of the 20th century, approximately half of graduating radiologists completed fellowships, compared to more than 90% in 2014.¹ Driving factors for this increase in specialization may be external or internal. External factors include demand by referring doctors and hospitals for a specialized radiologist to read new complex scans, or turf battles between hospitals and private practices. Another external factor could be an oversupply of radiologist, perhaps a side effect of increased consolidation. Consolidation in medicine is not new, however, consolidation in radiology is relatively new, possibly explaining the more recent push for radiology residents to specialize and increase their marketability. Some internal factors include personal satisfaction and the desire to have expertise in certain areas of academic interest. All of this has translated into a fundamental shift in the radiology job market.²

Residents are more likely to require a fellowship to be competitive in today's job market. One particularly troublesome factor is a possible oversupply of radiologists. In one 2012 study where an analysis of the ACR jobs board was done, the average number of job seekers was twice that of new job postings.³⁻⁵ In another 2016 study, the investigators found that the radiology job market is oversupplied, primarily due to increased residency positions and decreasing demand.⁶⁻⁸

Based upon this changing market dynamic, residents are more likely to pursue a fellowship. In one 2014 survey, 10% of residents were even pursuing a double fellowship.¹

Completing a fellowship has become paramount to a radiologist's marketability in this changing job market. In response, this study aimed to study current resident's interests in pursuing a fellowship. We also aimed to get a better picture of where residents are getting their information regarding fellowships. Lastly, this study intended to look at resident interest in a lecture series that is given by fellowship directors.

Methods

Survey Construction and Distribution

Institutional review board approval was obtained at University of Pennsylvania Health System. A 14 question survey was constructed in September of 2016 (Table 1) via the survey platform Qualtrics. The survey assessed the proportion of US trainees that desired or accepted fellowship training, field or fields of interest, and as well as perceptions of sources regarding fellowship selection. Demographic data were also collected, which included level of training and educational background. Finally, the desire for a fellowship lecture series provided by fellowship directors was queried. The questions were reviewed by multiple faculty members including the residency program director before being submitted to the Association of Program Coordinators in Radiology (APCR) for further review via e-mail. The APCR approved the

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TABLE 1

Survey

Question	R1	R2	R3	R4
What year of training are you currently in?	American Medical School Graduate		Foreign Medical School Graduate	
What best describes you?	DO	MD	MBBS	
Are you considering fellowship training?*	Yes	No	Unsure	
Are you going into fellowship?*	Yes	No		
Which fellowship are you pursuing? ¹	<ul style="list-style-type: none"> • Cardiac/chest • Vascular and interventional radiology • Neuro-interventional 	<ul style="list-style-type: none"> • Body • Nuclear medicine • Women's imaging • Emergency 	<ul style="list-style-type: none"> • Musculoskeletal radiology • Neuroradiology • Pediatric • Other 	
What fellowship(s) are you interested in?*				
What fellowship(s) are available at your institution?				
How confident are you with respect to the following:				
I know what fellowship I want	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree
I know what fellowships are looking for				Strongly disagree
I know what to look for in a fellowship				
I am doing the right things to obtain the fellowship I want				
Where have you received information about the fellowship selection process?	Online articles	Fellows	Residents	Attending (non-FD)
				Fellowship Director (NIF)
				Fellowship Director (IF)
				NRMP website
Rank your perception of reliability of sources of information regarding the fellowship match:				
Journal Articles	Extremely reliable	Very reliable	Moderately reliable	Slightly reliable
Fellows				Not at all reliable
Residents				
Attending (non-FD)				
Fellowship Director (NIF)				
Fellowship Director (IF)				
NRMP Website				
How Important do you think each of these factors are in the fellowship selection process				
Reputation of residency program	Extremely important	Very important	Moderately important	Slightly important
Reputation of medical school				Not at all important
Reputation of undergraduate				
AMG vs IMG; MD vs DO vs MBBS				
USMLE scores				
ABR in-service scores				
Performance during residency				
Performance during medical school				
Performance during interview				
Having a personal connection with the program				
Scholarly activity				
Leadership experience or other extracurricular				
Location of prior training				
How likely would you have been to attend a didactic lecture series in which you got face-to-face interaction with a Fellowship Director in your field of interest? ¹				
Extremely likely	Somewhat likely	Neither likely nor unlikely	Somewhat likely	Extremely unlikely
How likely are you to attend a didactic lecture series in which you get face to face interaction with a Fellowship Director in your field of interest?*				
Extremely likely	Somewhat likely	Neither likely nor unlikely	Somewhat likely	Extremely unlikely

*Only given to R1-R3 respondents.

¹Only given to R4 respondents; FD, fellowship director; NIF, not in field of interest; IF, in field of interest; NRMP, National Residency Matching Program; AMG, American medical graduate; IMG, international medical graduate.

TABLE 2
Respondent demographics

Demographics	N	%
Year of training		
R1	85	24.7
R2	98	28.5
R3	82	23.8
R4	79	23.0
American Medical School graduate	310	90.1
Foreign Medical School graduate	34	0.9
MD	295	85.8
DO	42	12.2
MBBS	7	2.0

TABLE 3
Fellowship intentions and interests

Fellowship intentions and interest	R1-3, N (%)	R4, N (%)
Pursuing fellowship/matched for fellowship		
Yes	261 (98.9)	79 (100)
No or unsure	3 (1.1)	0 (0)
Total	2,64,264	79
Fellowship interests		
Cardiac/chest	30 (14)	2
Vascular and interventional radiology	90 (42)	14
Body	90 (42)	9
Nuclear medicine	12 (6)	1
Musculoskeletal radiology	86 (40)	8
Neuroradiology	79 (37)	18
Neurointerventional	18 (8)	0
Women's imaging	46 (21)	9
Pediatric radiology	37 (17)	4
Emergency radiology	21 (10)	0
Other	7 (3)	2
Total	216	79

TABLE 4
Confidence in fellowship selection process

Confidence in fellowship selection	R1-3		R4	
	N	%	N	%
I know what fellowship I want				
Strongly agree	78	36.0	50	74.6
Somewhat agree	64	29.6	13	19.4
Neither agree nor disagree	17	0.8	2	3.0
Somewhat disagree	34	1.6	2	3.0
Strongly disagree	22	1.0	0	0
Total	216		67	
I know what fellowships are looking for				
Strongly agree	20	9.3	12	17.9
Somewhat agree	65	30.1	37	55.2
Neither agree nor disagree	48	22.2	14	20.9
Somewhat disagree	58	26.9	4	6
Strongly disagree	25	11.5	0	0
Total	216		67	
I know what to look for in a fellowship				
Strongly agree	18	8.3	14	20.9
Somewhat agree	73	33.8	41	61.2
Neither agree nor disagree	37	17.1	9	13.4
Somewhat disagree	66	30.6	2	3.0
Strongly disagree	22	1.0	1	1.5
Total	216		67	
I am doing the right things to obtain the fellowship I want				
Strongly agree	31	14.4	32	48.5
Somewhat agree	62	28.8	22	33.3
Neither agree nor disagree	87	40.4	10	15.2
Somewhat disagree	23	10.7	2	3.0
Strongly disagree	12	5.6	0	0
Total	215		66	

TABLE 5
Sources of fellowship information

Sources—usage	N = 267	%
Online articles	80	30
Fellows	172	64
Residents	257	96
Attendings other than fellowship directors	183	68
Fellowship director (NIF)	59	22
Fellowship director (IF)	100	37
NRMP website	41	15

TABLE 6
Reliability of different resources

Sources—reliability	R1-3		R4	
	N	%	N	%
Journal articles				
Extremely reliable	9	4.4	2	3.3
Very reliable	41	19.9	10	16.4
Moderately reliable	115	55.8	28	45.9
Slightly reliable	36	17.5	16	64.0
Not at all reliable	5	7.4	5	8.2
Total	206		61	
Fellows				
Extremely reliable	30	14.4	20	32.3
Very reliable	100	47.8	25	40.3
Moderately reliable	72	34.4	13	21.0
Slightly reliable	5	2.4	3	4.8
Not at all reliable	2	1.0	1	1.6
Total	209		62	
Residents				
Extremely reliable	12	5.7	4	6.3
Very reliable	68	32.2	28	44.4
Moderately reliable	100	47.4	23	36.5
Slightly reliable	25	11.8	7	11.1
Not at all reliable	6	2.8	1	1.6
Total	211		63	
Attendings who are not fellowship directors				
Extremely reliable	15	7.3	4	6.3
Very reliable	61	29.6	24	37.5
Moderately reliable	98	47.6	27	42.2
Slightly reliable	29	14.1	7	10.9
Not at all reliable	3	1.5	2	3.1
Total	206		64	
Fellowship director (NIF)				
Extremely reliable	23	11.2	8	13.1
Very reliable	88	42.7	16	26.2
Moderately reliable	75	36.4	27	44.3
Slightly reliable	18	8.7	7	11.5
Not at all reliable	2	1.0	3	4.9
Total	206		61	
Fellowship director (IF)				
Extremely reliable	69	33.5	18	29.0
Very reliable	90	43.7	26	41.9
Moderately reliable	38	18.4	16	25.8
Slightly reliable	7	3.4	1	1.6
Not at all reliable	2	1.0	1	1.6
Total	206		62	
NRMP website				
Extremely reliable	18	9.2	3	5.2
Very reliable	53	27.0	15	25.9
Moderately reliable	93	47.4	22	37.9
Slightly reliable	23	11.7	16	27.6
Not at all reliable	9	4.6	2	3.4
Total	196		58	

survey for e-mail distribution on September 14, 2016. A link to the survey was distributed to all 198 APCR members on September 15, 2016 via e-mail and recipients were asked to forward the survey to all radiology residents within their program.

Data collection and analysis: All surveys were completely anonymous. Surveys were collected between September 15, 2016 and December 1, 2016 via qualtrics. All surveys that were not finalized before December 1, 2016 were discarded. Data analysis were performed in SAS (SAS Institute). As the data were nonnormal, the Wilcoxon signed-rank test and the Kruskal-Wallis test were used to determine significance of relationships as defined by $P < 0.5$.

Results

A total of 344 respondents had completed the survey by the end of the collection period. This accounts for approximately 8.7% of the 3962 number of US trainees spread across 193 ACGME accredited programs.⁹ Actual respondent rate may be higher due to the potential for only partial redistribution of surveys by residency coordinators as well as exclusion of some programs that are not members of APCR.

Demographics are displayed in Table 2. All 4 years of residency training are almost equally represented in the respondent population. Most respondents are allopathic American medical school graduates with a few graduates of foreign medical schools and osteopathic schools (Table 2).

The vast majority of respondents are interested in pursuing a fellowship and all R4 respondents plan on fellowship training. The most popular fellowships are interventional radiology, body, musculoskeletal, and neuroradiology (Table 3).

The vast majority of residents expressed confidence in knowing what fellowship they wanted; however, few were as confident when asked about what fellowships were looking for, what to look for in a fellowship, or if they were taking to the right steps to obtain the fellowship they wanted (Table 4). The R4 respondents were significantly more confident than the R1-3 ($P < 0.0001$), which is expected as they have all been through the match process. Confidence also appeared to increase as year in training increased with the largest difference occurring between the R2 and R3 respondents ($P < 0.0001$).

Residents were also asked which sources they used to learn about fellowship selection and to rank how reliable different resources are regarding fellowship matches. The most used resources were residents, attendings not in field of interest and fellows (Table 5). Residents believe that fellowship directors in their field of intent were the most reliable ($P < 0.0001$) followed by fellows and then fellowship directors ($P = 0.0002$ and 0.0041). National Residency Matching Program website and journal articles were the least reliable (Table 6).

When asked what the most important factors used by fellowship directors in the selection process are, residents ranked performance during the interview and during residency, personal connection with the program, and residency reputation as the most important. ABR

TABLE 7
Importance of different factors used by fellowship programs in the selection process

	Reputation of your residency program		Reputation of your medical school		Reputation of your undergraduate	
	%	N	%	N	%	N
Extremely important	31.77	88	7.25	20	2.54	7
Very important	43.32	120	22.46	62	3.62	10
Moderately important	20.94	58	35.14	97	18.48	51
Slightly important	3.25	9	30.43	84	34.06	94
Not at all important	0.72	2	4.71	13	41.30	114
Total		277		276		276
	MD vs DO vs MBBS ; AMG vs IMG		USMLE step scores		ABR in-service scores	
Extremely important	13.72	38	3.97	11	2.17	6
Very important	29.96	83	19.13	53	13.04	36
Moderately important	35.38	98	40.79	113	24.64	68
Slightly important	17.33	48	27.08	75	27.90	77
Not at all important	3.61	10	9.03	25	32.25	89
Total		277		277		276
	Performance during residency		Performance during medical school		Performance during interview	
Extremely important	53.26	147	1.81	5	58.03	159
Very important	39.86	110	15.94	44	36.50	100
Moderately important	5.80	16	50.00	138	4.74	13
Slightly important	0.36	1	25.72	71	0.73	2
Not at all important	0.72	2	6.52	18	0.00	0
Total		276		276		274
	Having a personal connection with the program (friend and mentor)		Scholarly activity (publications and presentations)		Leadership experience or other extracurricular (local or national committees; awards)	
Extremely important	47.64	131	17.88	49	10.55	29
Very important	34.91	96	47.08	129	40.00	110
Moderately important	14.18	39	31.39	86	36.00	99
Slightly important	3.27	9	3.28	9	12.00	33
Not at all important	0.00	0	0.36	1	1.45	4
Total		275		274		275
<i>Location of prior training</i>						
Extremely important	13.55	37				
Very important	35.16	96				
Moderately important	33.33	91				
Slightly important	13.92	38				
Not at all important	4.03	11				
Total		273				

TABLE 8
Likelihood of residents attending lecture series led by fellowship directors

Likelihood of attending didactic lecture given by fellowship director in field of interest	R1-3		R4	
	N	%	N	%
Journal articles				
Extremely likely	94	43.7	31	47.0
Somewhat likely	41	19.1	27	40.9
Neither likely or unlikely	77	35.8	2	3.0
Somewhat unlikely	8	3.7	2	3.0
Extremely unlikely	3	1.4	2	3.0
Total	215		66	

in-service examination scores and undergraduate reputation were considered least important (Table 7).

Most residents are interested in attending a didactic lecture series in which they would get face to face interaction with a fellowship director in their field of interest (Table 8). There was no difference in interest between R1-3 and R4.

Discussion

Data have shown that the radiology job market has proved to be challenging for residents. This has driven residents to complete a fellowship, and in some cases a double fellowship.¹ In one 2014 chief resident survey, most residents were split between “a little worried” and “worried when it came to their future job prospects.”¹⁰ The chief residents also felt that the state of the job market is discouraging top tier medical students from entering radiology.¹⁰ Our study demonstrates that 99% of residents surveyed plan to pursue a fellowship. Two other studies in the literature have had similar results, with one 2015 survey reporting 96% and another Canadian survey reporting 89%.^{11,12}

We also found that the specific fellowships that residents are interested in are consistent through the literature. Our survey found that interventional radiology, neuroradiology, body, and musculoskeletal fellowships are the most popular. We were interested in learning where residents gathered information on fellowships. Where one does fellowship is important and so the use of reputable sources is paramount. Our study found that residents found fellowship directors in their field of interest and fellows currently in the field to be the most reliable source of information. The residents felt that journal articles and the National Residency Matching Program website were the least reliable. One 2016 survey completed in Canada, reported similar results: they found that 68% of residents received their information from their peers, and 61% from staff radiologist.¹² This informal information gathering is not ideal for selecting fellowships that will affect ones career so much.

However, there are some limitations to our survey. As any survey, there is a possibility for under sampling. However, we believe that we have a good distribution of R1-R4s. There are multiple data points that are corroborated by similar surveys done at other institutions, such as the proportion of residents that plan to do a fellowship as well as the distribution of the most popular fellowships. The survey also gave insight into

what residents think are the most salient factors that fellowship directors look for in residents. We found that residents believe performance during residency and interview as well as a personal connection, through a friend or mentor, are the most important factors for a fellowship director in choosing their fellows.

Lastly, our survey was unique in surveying resident’s interest in a fellowship director led lecture series. Totally, 44% of residents said they would be extremely likely and 36% reported somewhat likely to attend such a lecture series. This lecture series would allow residents to interact directly with fellowship directors, giving a direct route to the information source that residents found to be most reliable. With only 215 respondents to this portion of the survey, we lack significant power. However, the survey demonstrates that a trial of fellowship director led lecture series is warranted.

Conclusion

The desire to pursue fellowship training is almost a given in our current environment. There is a plethora of information out there but not all is perceived equal. Our survey reveals that fellowship directors in the field of interest are irrevocably more trusted resource and that there is high interest in a lecture series that would bring together fellowship directors and residents that are interested in that particular fellowship. A pilot study is currently underway to test the feasibility of introducing such a lecture series into the curriculum at our institution.

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