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Factors influencing selection of an interventional radiology training program☆

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ABSTRACT

Purpose: To understand factors influencing the choice and ranking of Interventional Radiology (IR) training programs among a cohort of medical students and diagnostic radiology residents pursuing careers in IR.

Materials and methods: An IRB approved, 34 question online survey (surveymonkey.com) evaluated the impact of twenty-two different factors and demographics on IR training program selection for medical students and residents. The factors analyzed included programmatic features, location characteristics, academic reputation, program size, benefits/financial incentives, emphasis on clinical care, and future job opportunities. Comparison of Likert scale responses between medical students and residents were performed by using unpaired two-sample *t*-tests.

Results: 181 (145 male, 35 female) individuals responded to the survey, 74 medical students (40.9%) and 107 residents (59.1%). Medical students and residents both selected variety of IR cases as the most important and highest rated factor when choosing an IR program. Medical students ranked availability of a mentor ($p = .03$), inpatient consultation service ($p = .003$), outpatient clinic experience ($p = .003$), and ICU rotation experience ($p < .001$) significantly higher. Residents rated job placement/accomplishments of prior fellows ($p = .03$) and opinion of spouse/significant others ($p = .002$) significantly higher than medical students.

Conclusions: The top rated factors are similar among medical students and residents however medical students value the clinical aspects of the program (ICU experience, inpatient consultation service, outpatient clinic) more than residents. Residents placed more value on job placement opportunities in selecting an IR program.

1. Introduction

The evolution of Interventional Radiology (IR) from a subspecialty of Diagnostic Radiology (DR) to recognition as a primary specialty in 2012 by the American Board of Medical Specialties (ABMS) led to the creation of the Integrated IR residency directly offered to medical students. At the same time, the IR training pathway for DR residents is in the process of transitioning away from the traditional 1 year fellowship to the Early Specialization in Intervention Radiology (ESIR) and 2-year Independent IR residency options. The integrated IR residency was markedly competitive, with a 100% match rate (607 applicants vying for 133 positions) and 90% of positions were filled by United States medical graduates [1,2]. Given the competitiveness among medical students to secure an IR training position, it is reasonable to assume there will be an additional cohorts pursuing IR training through DR residency pathways.

Increased awareness and exposure to IR is occurring more frequently at the medical student level. Formal rotations in IR are now offered at most U.S. medical schools, in contrast to 2013 where only 5.5% of medical students reported to have participated in an IR rotation [3]. As more medical students and diagnostic radiology residents are deciding at an earlier stage to pursue IR, it is important to understand the factors influencing IR program selection. These factors have been studied among other specialties [4–9] including diagnostic radiology [10–12], but it is unclear whether those findings can be extrapolated to IR.

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DePietro et al. recently reported results of a comprehensive survey examining experiences of sixty-one matched Integrated IR applicants during the 2017 Match cycle and included data on program factors influencing their choice of programs [13]. However, it is unclear whether these findings can also be applied to current DR residents intending to pursue IR. The objective of this study was to further understand factors influencing the choice and ranking of IR training programs among a cohort of medical students and DR residents pursuing careers in IR and whether these differed among the two groups.

2. Methods

Institutional review board approval was obtained for this survey-based study. All surveys were anonymous and voluntary. Surveys were constructed and administered via surveymonkey.com. Surveys were approved by the Society of Interventional Radiology Resident and Fellow Section (SIRRFS) and Association of Program Coordinators in Radiology (APCR) for distribution. The SIRRFS distributed surveys to its members and each coordinator in the APCR emailed medical students and residents in their respective programs. Email invitations to fill out the survey were sent once.

Surveys were released on August 6th, 2017 and remained open for four weeks. If the survey link was accessed it contained an opening message relaying the survey's intent, privacy policy, and investigator details.

2.1. Survey design

A thirty four question survey was constructed gathering demographic data and information on factors in choosing an Interventional Radiology (IR) training program. Data was gathered using a five-point Likert scale, with 1 indicating that the factor was not important and 5 indicating that the factor was very important. The following demographic data was collected: age, gender, marital status, medical student/resident status, year in training, medical school location, and hometown geographic location. A total of twenty-two factors were analyzed that included programmatic features, location characteristics, academic reputation, program size, benefits/financial incentives, emphasis on clinical care, and future job opportunities.

2.2. Statistical analysis

Summary statistics were used to describe categorical variables. Descriptive statistics were used to describe continuous variables. Comparison of Likert scale responses between medical students and residents were performed by using unpaired two-sample *t*-tests. p values of less than .05 were considered statistically significant.

3. Results

181 trainees responded to the survey, 74 medical students (40.9%) and 107 residents (59.1%). The survey was completed in its entirety by 176 respondents (97.2%). There were 145 males (80.6%) and 35 females (19.4%) that completed the survey. Of the medical students that responded, 53 (27%) were in their 4th year of training. The mean age for medical students and residents was 26.4 years and 30.9 years respectively. Additional information regarding level of training, geographic data, marital status, family planning status are summarized in Tables 1 and 2.

Respondents were asked to evaluate several factors that could potentially affect their decision in selecting an IR training program. The top five factors rated by medical students surveyed were the variety of IR cases (4.78 ± 0.5), perceived happiness of the trainees at the institution (4.64 ± 0.56), procedural volume (4.5 ± 0.57), available mentor at the IR training program (4.47 ± 0.76), and interpersonal interactions with the faculty/trainees (4.38 ± 0.75) (Table 3).

Table 1
Demographic data (medical students, n = 74).

Age	Mean (standard deviation)	26.4 (2.65)
Sex	Male	53
	Female	21
	Other	0
Level of training	MS-1	0
	MS-2	5
	MS-3	16
	MS-4	53
Medical school region	Northeast	25
	South	20
	Midwest	19
	West	9
	Outside of the United States	1
Birth region	Northeast	21
	South	19
	Midwest	15
	West	14
	Outside of the United States	5
Current application status to an IR program	Not applying this year	26
	Applying this year	48
Marital status	Single	50
	Married	24
	Divorced/separated	0
	Widowed	0
Children (n = 73)	No children	67
	One	3
	Two	2
	Three	0
	Four	1
	Five or more	0

MS – medical student.

Table 2
Demographic data – residents (n = 107).

Age	Average (standard deviation)	30.94 (4.64)
Sex	Male	92
	Female	14
	Other	0
Level of training	Intern	3
	R-1	33
	R-2	28
	R-3	21
	R-4	22
Medical school region	Northeast	33
	South	22
	Midwest	39
	West	13
	Outside of the United States	0
Birth region	Northeast	17
	South	20
	Midwest	33
	West	28
	Outside of the United States	9
Marital status	Single	31
	Married	74
	Divorced/separated	2
	Widowed	0
Children (n = 106)	No children	69
	One	20
	Two	11
	Three	4
	Four	2
	Five or more	0

R - resident.

Residents surveyed reported the top five factors to be variety of IR cases (4.83 ± 0.44), procedural volume (4.63 ± 0.54), job placement/accomplishments of prior fellows (4.56 ± 0.64), perceived happiness of the trainees at the institution (4.45 ± 0.78), and interpersonal

Table 3
Factor rankings – comparison of medical students and residents.

Factor	Medical students	Residents	p-Value
	Mean (standard deviation)	Mean (standard deviation)	
Variety of IR cases	4.78 (0.50)	4.83 (0.44)	.480
Perceived happiness of the trainees at the institution	4.64 (0.56)	4.45 (0.78)	.070
Procedural volume	4.57 (0.57)	4.63 (0.54)	.480
Available mentor at the IR training program	4.47 (0.76)	4.21 (0.84)	**.030**
Interpersonal interactions with the faculty/fellows/residents during interview	4.38 (0.75)	4.4 (0.84)	.870
Job placement/accomplishments of prior fellows	4.32 (0.82)	4.56 (0.64)	**.030**
IR relationship with referring specialties	4.3 (0.71)	4.18 (0.90)	.340
Geographic location	4.01 (0.94)	4.05 (0.91)	.720
Inpatient consultation service	4.0 (0.81)	3.5 (1.24)	**.003**
Outpatient clinic experience	3.91 (1.02)	3.44 (1.2)	**.003**
National reputation of the IR program/reputation of the IR faculty	3.86 (0.98)	3.91 (0.92)	.730
ICU rotation experience	3.78 (0.96)	2.93 (1.27)	**.000**
Reputation of the DR training program	3.77 (0.92)	3.29 (1.05)	.002
Call schedule/work hours	3.76 (0.91)	3.77 (1.0)	.950
Recommended by current mentor	3.69 (1.11)	3.89 (0.78)	.160
Potential for research opportunities during fellowship	3.55 (0.95)	2.98 (1.19)	**.001**
Didactics	3.45 (0.93)	3.41 (1.02)	.790
Cost of living	3.28 (1.1)	3.31 (1.05)	.850
Salary/benefits/compensation	3.2 (1.0)	3.21 (1.04)	.950
Opinion of spouse/significant others	3.2 (1.4)	3.8 (1.15)	**.002**
Moonlighting opportunities	3.03 (1.1)	2.94 (1.21)	.610
DR class size	2.68 (1.02)	2.66 (1.22)	.910

IR – interventional radiology.
DR – diagnostic radiology.

interactions with the faculty/trainees (4.40 ± 0.84) (Tables 3).

The five lowest rated factors for medical students were diagnostic radiology class size (2.68 ± 1.02), moonlighting opportunities (3.03 ± 1.1), salary/compensation (3.2 ± 1.0), opinion of spouse/significant others (3.2 ± 1.4), and cost of living (3.28 ± 1.1). The five lowest rated factors for residents were diagnostic radiology class size (2.66 ± 1.22), ICU rotation experience (2.93 ± 1.27), moonlighting opportunities (2.94 ± 1.21), potential for research opportunities (2.98 ± 1.19), and salary/compensation (3.21 ± 1.04).

Analysis of each factor between the two groups (medical students vs. residents) found significant differences. The following factors were rated significantly higher for medical students than residents: availability of a mentor at the IR training program (4.47 ± 0.76 vs. 4.21, ± 0.84, p = .03), inpatient consultation service (4.0 vs. 3.5, p = .003), outpatient clinic experience (3.91 ± 1.02 vs 3.44 ± 1.20, p = .003), ICU rotation experience (3.78 ± 0.96 vs 2.93 ± 1.27, p < .001), reputation of diagnostic radiology training program (3.77 ± 0.92 vs 3.29 ± 1.05, p = .002), potential for research opportunities during fellowship (3.55 ± 0.95 vs 2.98 ± 1.19, p = .001). Residents rated job placement/accomplishments of prior fellows (4.56 ± 0.64 vs 4.32 ± 0.82, p = .03) and opinion of spouse/significant others (3.8 ± 1.15 vs 3.2 ± 1.40, p = .002) significantly higher than medical students (Table 3).

When respondents were asked 'when choosing an IR training program, which factor is *most* important, medical students selected variety of IR cases (28.4%) as the most important, followed by national/IR faculty reputation (16.2%), and perceived happiness of trainees at the institution (14.9%) (Fig. 1). Residents selected variety of IR cases (24%) as the most important factor followed by national/IR faculty reputation (22%), and job placement/accomplishments of prior fellows (21%) (Fig. 2).

4. Discussion

The establishment of IR as a distinct specialty has led to a transition period for programs across the country. IR program directors are tasked with creating a new program structure, implementing a clinical-based curriculum, and conducting a selection/interview process. The purpose of this survey was to provide program directors with guidance as to what applicants value in a training program.

In the current survey, among medical students the top three factors were variety of IR cases, perceived happiness of the trainees, and procedural volume. For residents surveyed, variety of IR cases, procedural volume, and job placement/accomplishments of prior fellows were the most important factors. These findings are consistent with the recently published study by DePietro et al. where friendliness/approachability of the faculty, happiness of the current trainees, and diversity of IR cases were highly rated [13]. Many of the factors surveyed in the current study were not asked in the DiPietro study, such as jobplacement/accomplishments of prior fellows, the presence of a consultation service, outpatient clinic experience, and ICU experience, which makes cross-comparison difficult. Compensation, cost of living, and compensation were all ranked in the lower half of both surveys [13].

When asked to select the 'most important' factor in selecting an IR training program, *variety of cases* was the most chosen factor by both medical students and resident. Variety of IR cases was the high rated overall factor as well. Knowing that variety of cases is the most important factor for trainees may serve as motivation to expand clinical service lines and foster collaboration with other clinical services. National reputation of the program and faculty was selected by several respondents as the most important factor. This indirectly implies that faculty productivity, recruitment, and retention should be prioritized by Radiology departments.

Interestingly, there were significant differences between the two groups regarding the importance of multiple factors, namely ICU experience, the presence of an inpatient consult service, and an outpatient IR clinic. Medical students placed a significantly higher value on the aforementioned. These findings indicate that trainee recruitment process should emphasize different programmatic elements. Further, it appears that the newer generation of recruits prioritize clinical training. Program directors and interviewers could highlight certain aspects of an IR program that medical students or residents may find desirable.

Further, medical students placed more value on mentorship and research opportunities. Generally, medical students are entering programs and will have a more longitudinal relationship with the institution where they are completing training. Formal mentorship programs

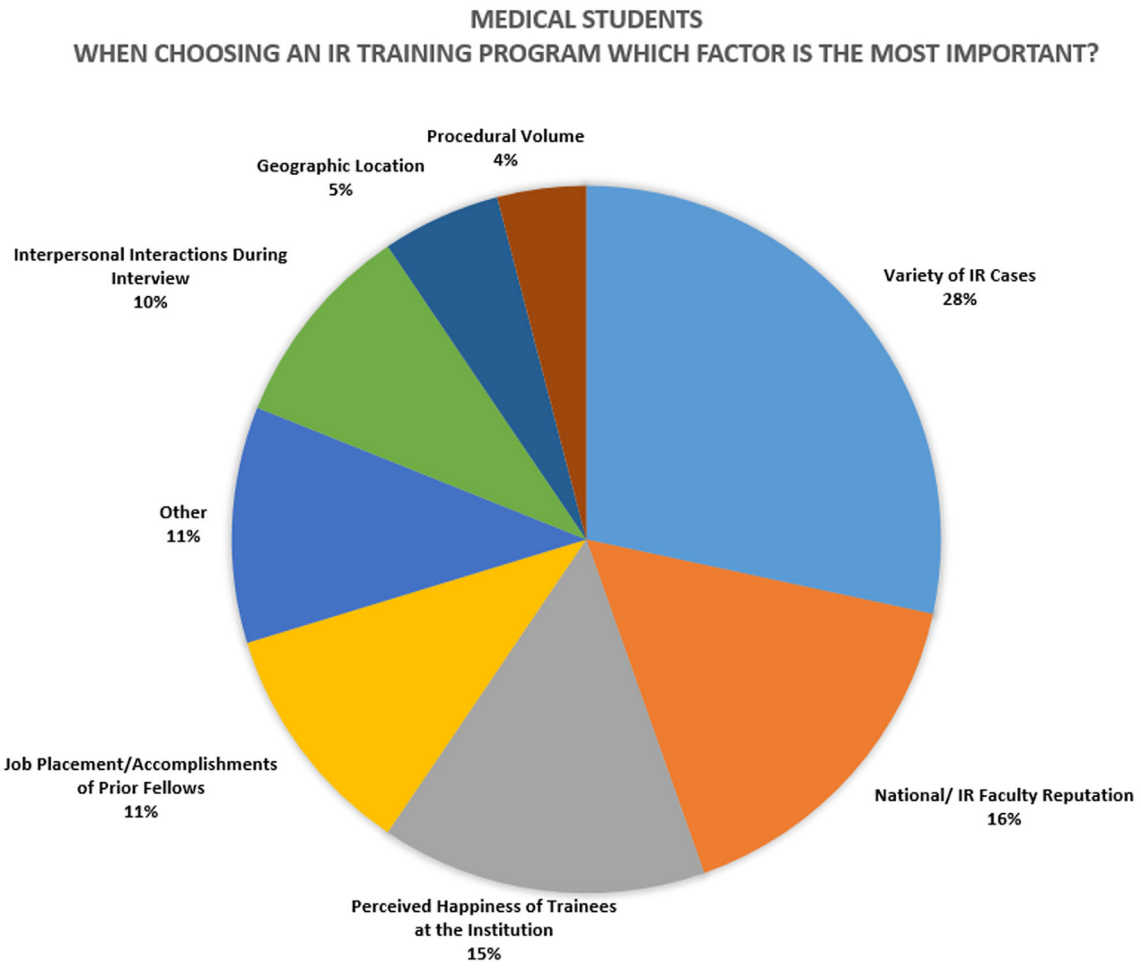

Fig. 1. Medical student respondent data regarding which factor is most important in selecting an IR training program.

have been shown to improve personal development, research productivity, and career satisfaction [14–16]. Program directors in Radiology have found mentorship to be an important resource for professional development [17]. Establishing an official mentorship program would likely be of benefit to the recruiting process.

Residents placed more value on the opinion of spouses/significant others and job placement/accomplishments of prior fellows. The average age of residents surveyed was higher than that of medical students and more residents either were married or had a significant other in comparison. Further, it can be assumed that residents are more focused on job placement as they are further along in their medical training. Medical students applying to IR residency have a much longer training commitment than do residents applying for IR fellowship. Thus it is not surprising that residents applying to an IR fellowship prioritize job opportunities. For independent programs, this may serve as a guide to focus on programmatic aspects that accommodate families and spouses and to focus on job placement during recruitment.

There are multiple limitations to this study. As with any survey instrument, volunteer bias is inherent to this study design and may affect generalizability. Further, respondents may have not interpreted the questions as intended which would affect gross generalizations. Questions on ethnicity were not asked on this survey and therefore the results may not be applicable to all groups. Also, given that many factors can contribute to residency selection, a single survey may not capture all the necessary information. There are potentially factors that respondents value that were not asked on this survey. We attempted to mitigate this by reviewing previously published literature. There are some small numerical yet statistically significant differences between groups and may not represent truly meaningful differences.

5. Conclusions

Medical students and residents both rated and selected variety of IR cases as the most important factor in choosing a training program. Although the top rated factors are similar among medical students and residents, it appears that medical students value the clinical aspects of the program (ICU experience, inpatient consultation service, outpatient clinic) more than residents. Residents tended to place more value on job placement opportunities in selecting an IR program. The results of this survey indicate that a more targeted approach is needed when recruiting. Most, if not all, of the factors that each group valued should be addressed during the interview period by program directors and other interviewers.

Declaration of Competing Interest

None of the authors have any reportable conflicts of interest.

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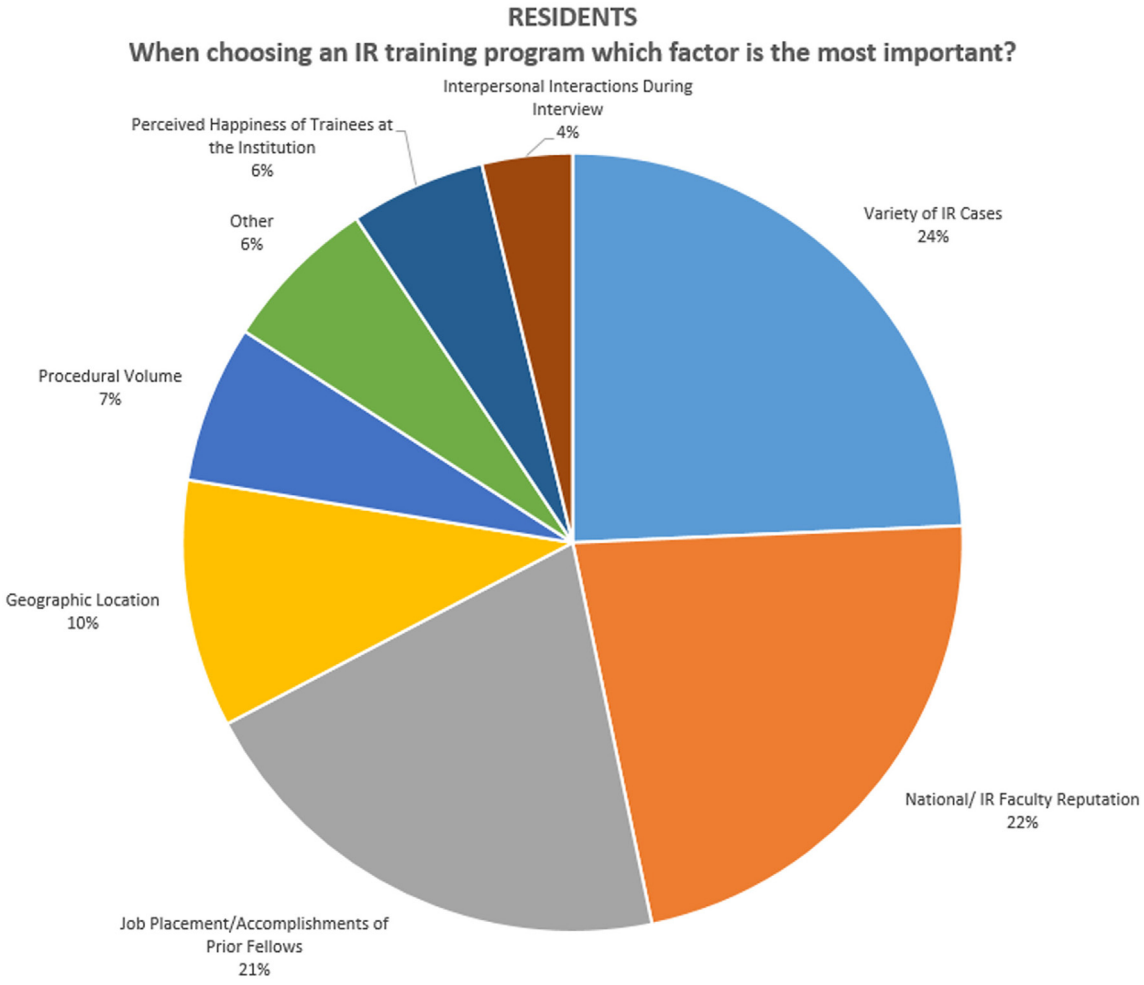

Fig. 2. Resident respondent data regarding which factor is most important in selecting an IR training program.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.clinimag.2019.05.001.

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