



# Current Problems in Diagnostic Radiology

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## Institutional Interventional Radiology Symposium Increases Medical Student Interest and Identifies Target Recruitment Candidates

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### ABSTRACT

**Objectives:** To assess and raise medical student interest in interventional radiology (IR); and to evaluate student response across gender, level of training, and surgical vs nonsurgical specialty interest.

**Materials and Methods:** All Ohio medical students were invited to an IR Symposium held by a large academic medical center in central Ohio. The program encompassed didactic lectures, hands-on simulation models, and a networking luncheon with faculty, trainees, and industry partners. All attendees completed an anonymous, 5-point Likert scaled survey preattending and postattending the event to assess their awareness of IR as a specialty, understanding of the current training pathways, and level of interest.

**Results:** A total of 46 participants (M:F 60%:40%, MS1–53%, MS2–36%, and MS3–11%) attended the symposium. The cohort demonstrated increased interest in pursuing a career in IR following the symposium (4.12 vs 3.70,  $P < 0.001$ ). Students with an interest in a nonsurgical specialty showed an increased interest in IR (4.20 vs 3.68,  $P < 0.001$ ), whereas surgically oriented students did not demonstrate a significant increase (4.00 vs 3.71,  $P = 0.375$ ). No statistically significant differences were noted across gender or level of training. The symposium experience significantly increased understanding of the IR training pathways (4.51 vs 2.94,  $P < 0.001$ ). Students rated lectures (57%) and endovascular simulators (41%) as the most useful experiences.

**Conclusions:** This study demonstrated the role of symposia in improving medical student awareness of IR and training pathways. Findings were validated across gender and training level, and identified the subset of students with nonsurgical interests as most responsive to such intervention and potential recruitment.

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### Introduction

With the recent recognition of interventional radiology (IR) as a distinct primary specialty by the American Board of Medical Specialties (ABMS) in 2012 and the planned nationwide transition to dedicated IR residencies by 2020 in lieu of the current fellowships, the field has rapidly transformed and a new need for shifting recruitment efforts from radiology residents to medical students has emerged.<sup>1</sup> Several studies have demonstrated that most medical students unfortunately lack the exposure to and understanding of IR, and most do not consider IR as a potential career choice.<sup>1,2</sup> Possible reasons for the current diminished interest in pursuing IR among medical students include lack of knowledge, misconceptions about the field, and limited-to-no medical school curriculum exposure to IR.<sup>1–4</sup>

Despite the importance of early exposure to IR in gaining understanding of the field, current medical school curricula have fallen short in providing students adequate exposure. According to a recent study by Nissim et al,<sup>2</sup> 1.7% of surveyed medical students reported having a required rotation in diagnostic radiology, with only 0.4% reporting a required IR rotation. With such low levels of baseline

exposure to IR, and today's medical students forming the core of future interventional radiologists and future referring physicians, it is imperative that efforts be made to fully understand the complex aspects of the career choices made by these students and improve their understanding of the field. Hence, the objectives of this study were<sup>1</sup> to assess and raise medical student interest in the IR specialty and awareness of the available training pathways via a state-wide IR symposium; and<sup>2</sup> to evaluate student response across gender, level of training, and surgical vs nonsurgical specialty interest.

### Materials and Methods

#### Study Design and Participant Population

All Ohio medical students were invited to an IR symposium held by a large academic medical center in central Ohio in January 2017. All 46 attendees participated in anonymous presymposium and post-symposium surveys. The surveys included nine Likert scale questions assessing understanding of the specialty, training pathways, and level of interest (Table 1). Additional demographic information including gender, level of training, exposure to IR and available resources at home institution, and baseline interest in a medical vs a surgical specialty were also obtained to gain understanding of the participant population. The anonymous presurvey and postsurvey responses

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**TABLE 1**  
Survey assessing medical student understanding of the specialty, training pathways, and level of interest

Survey question	Average prescore	Average postscore	p
Do you feel you understand the difference between a Diagnostic Radiologist and an Interventional Radiologist?	3.86	4.57	<0.001
Do you feel you understand what an Interventional Radiologist does?	3.47	4.53	<0.001
Do you know when to consult an Interventional Radiologist for patient care?	2.47	4.07	<0.001
Do you know which medical conditions/disease processes an Interventional Radiologist may manage?	3	4.4	<0.001
Are you interested in pursuing a career in Interventional Radiology?	3.7	4.12	<0.001
Are you interested in pursuing a career in Diagnostic Radiology?	3.07	3.35	0.023
Are you interested in being a part of Interventional Radiology research?	3.51	3.86	<0.001
How do you rate your understanding of the training pathways available to become an Interventional Radiologist?	2.93	4.51	<0.001
Are you concerned about turf wars between IR and other specialties?	3.12	3.28	0.202

were linked via last 4 digits of attendee phone numbers to allow for result pairing and accurate interpretation of the outcomes.

### IR Symposium

The symposium was an all-day event including seven didactic lectures led by IR faculty from several Midwestern institutions, networking lunch with faculty, trainees, and industry representatives, and a hands-on simulation model session (Table 2). The lecture program was designed to provide an overview of the specialty via 20-minute sessions covering major IR treatments as well as a 40-minute session covering the current training pathways. Each session included built-in time for the attendees to ask questions. Following the lectures, lunch with faculty and trainees allowed for additional opportunities to share the daily lives of interventionalists during training and beyond, as well as a more personalized time to answer student questions. Subsequently, the participants experienced several hands-on training activities using ultrasound-guided biopsy stations, endovascular simulators, and a coil-embolization model. Lastly, closing remarks were delivered followed by sharing the moderators' contact information and a final opportunity for answering student questions.

### Statistical Analysis

Likert data were evaluated by mean and 95% CI, using a 5-point scale where 1 indicated "strongly disagree" and 5 indicated "strongly agree." The presurveys and postsurveys were summarized for each group as well as stratified by gender, level of training, and surgical or nonsurgical interests. The differences between the presurvey and postsurvey cohorts were compared using a Wilcoxon signed rank test for nonparametric paired ordinal data and  $\chi^2$  test for categorical data. The significance level was set a priori at  $\alpha \leq 0.05$ . Statistical analysis was performed using JMP 11 (SAS Institute Inc, Cary, NC).

**TABLE 2**  
Program of an all-day state-wide medical student interventional radiology symposium

Time	Session
10:00AM – 10:10AM	Welcome
10:10AM – 10:50AM	Introduction to IR and training pathways
10:50AM – 11:10AM	IR and hemorrhage management
11:10AM – 11:30AM	IR and vascular disease
11:30AM – 11:50AM	IR and biliary and renal disease
11:50AM – 12:10PM	Interventional oncology—ablation
12:10PM – 12:30PM	Interventional oncology—TACE/Y90
12:30PM – 12:50PM	Pediatric IR
12:50PM – 1:50PM	Networking lunch with attendings, residents, fellows
1:50PM – 4:00PM	Hands-on simulation session
4:00PM – 4:30PM	Q&A and Conclusion

### Results

The event was well attended with 46 participants (M:F 60%:40%) from 2 medical schools (Table 3). The symposium predominantly attracted preclinical students (MS1—53%, MS2—36%, and MS3—11%). Most students who participated had not attended a previous IR interest group event or symposium (75%). Most attendees were interested in a medical specialty (38%), followed by IR (29%), surgical specialty (21%), and diagnostic radiology (12%). The most commonly ranked first choice medical specialties were internal medicine,<sup>4</sup> emergency medicine,<sup>3</sup> pediatrics,<sup>2</sup> and medical oncology.<sup>2</sup> The most common first choice surgical specialties per the surveyed students were general surgery,<sup>2</sup> plastic surgery,<sup>2</sup> obstetrics and gynecology,<sup>2</sup> and otolaryngology.<sup>2</sup>

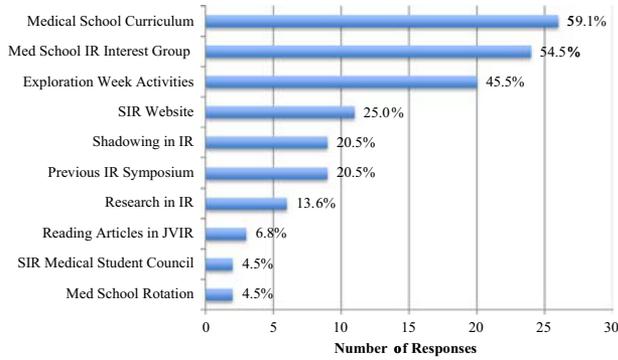
The participants were asked to report the sources of their exposure to the IR specialty (Fig 1). Students rated medical school curriculum (59.1%) and IR interest group activities (54.5%) as the most common ways they gained exposure to IR. Only 20.5% of the students shadowed an interventional radiologist or attended a previous IR symposium at their institutions. All attendees reported an available IR elective rotation at their home institutions and 62% of the students reported interest in completing an IR elective at some point before their graduation from medical school.

Of the 9 questions specific to the IR specialty awareness and interest, 8 questions demonstrated a statistically significant increase of approximately one point on the 5-point Likert scale following the symposium (Table 1). Students showed an increased understanding of the difference between IR and diagnostic radiology (DR) (3.86 vs 4.57) as well as

**TABLE 3**  
Demographics and baseline characteristics of surveyed medical student cohort

Characteristics	Number (%)
Gender	
Male	27 (60%)
Female	18 (40%)
Year of training	
M1	25 (53%)
M2	17 (36%)
M3	5 (11%)
IR clerkship offered at home institution	
Yes	46 (100%)
No	0 (0%)
Attendance of a previous IRIG event	
Yes	12 (25%)
No	35 (75%)
Interested in doing an IR rotation	
Yes	25 (58%)
Not sure	18 (42%)
No	0 (0%)
First choice specialty preference	
Interventional radiology	12 (29%)
Diagnostic radiology	5 (12%)
Medicine specialty	16 (38%)
Surgical specialty	9 (21%)

### Student Exposure to IR

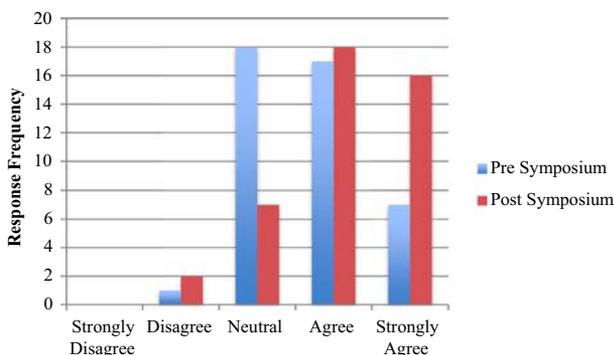


**FIG 1.** Sources of baseline exposure to interventional radiology for the medical student participants in the IR symposium. (Color version of the figure available online.)

the role of an interventional radiologist in practice (3.47 vs 4.53). Students demonstrated an increased awareness of when to consult an interventional radiologist for patient care (2.47 vs 4.07) as well as the breadth of medical conditions encountered (3 vs 4.4). Overall, the symposium increased participant interest in pursuing a career in IR (3.7 vs 4.12) as well as in DR (3.07 vs 3.35), which are further stratified in [Figures 2 and 3](#). Interest in IR was further reflected by increased intent in getting involved in IR research (3.51 vs 3.86) as shown in [Figure 4](#). In addition to increased understanding of IR and interest in pursuing a career in the field, the symposium was also an effective tool for increasing participant awareness of available training pathways to become an IR (2.93 vs 4.51).

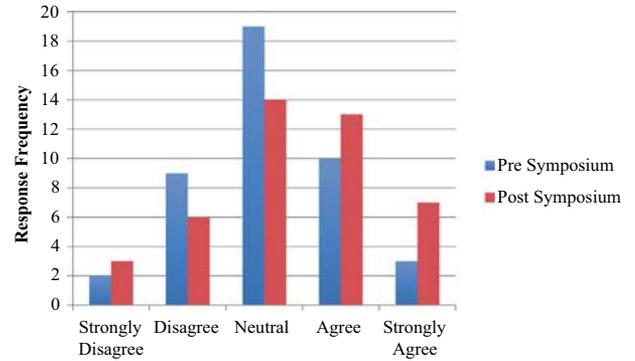
The previously described statistically significant differences largely persisted when the data was stratified by gender and by surgical vs medical specialty baseline interest. The only exceptions for these trends were the 3 questions evaluating interest in pursuing a career in IR, interest in pursuing a career in DR, and interest in being part of IR research. For the 2 questions regarding interests in DR and IR careers, students with a baseline interest in a medical specialty demonstrated statistically significant increases following the symposium (DR: 3.14 vs 3.56; IR: 3.68 vs 4.2), but surgically minded students did not experience a significant change in career goals (DR: 3 vs 3; IR: 3.71 vs 4). Likewise, students with a medical specialty career interest further demonstrated a statistically significant increased interest in getting involved in the field via performing IR research (DR: 3 vs 3; IR: 3.71 vs 4), but their fellow students with surgical interests did not significantly experience increased interest after participating in the symposium (3.29 vs 3.67).

### Are you interested in pursuing a career in Interventional Radiology?



**FIG 2.** Presymposium and postsymposium medical student responses to the question “Are you interested in pursuing a career in Interventional Radiology?”. (Color version of the figure available online.)

### Are you interested in pursuing a career in Diagnostic Radiology?



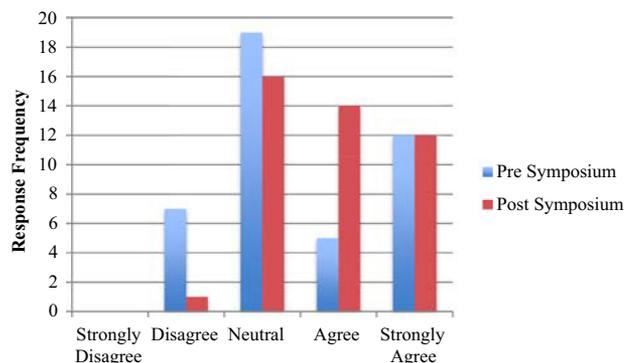
**FIG 3.** Presymposium and postsymposium medical student responses to the question “Are you interested in pursuing a career in Diagnostic Radiology?”. (Color version of the figure available online.)

Lastly, participants were asked to rate the various sessions of the symposium to determine effective awareness strategies. Overall, all aspects of the symposium were generally well received. Students favored lectures by faculty members (59%) and hands-on simulation using endovascular simulators (43%) as the most effective tools in increasing their awareness of IR. The coil-embolization model activity was the least helpful tool for gaining IR understanding (36%). Detailed student ratings of the symposium activities are shown in [Figure 5](#).

### Discussion

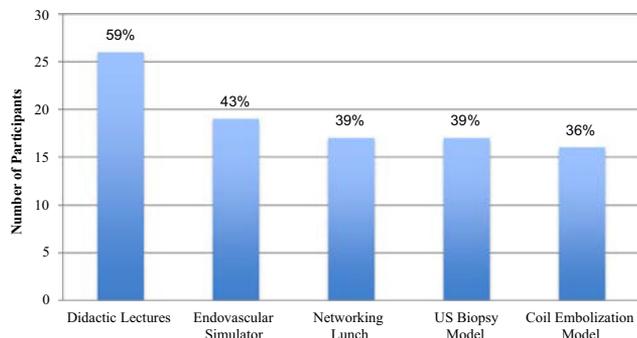
Driven by its recent recognition as a primary medical specialty and the subsequent introduction of the new IR residency, the IR field experienced tremendous leaps of growth over the past decade. Understanding of this dynamic and evolving specialty among prospective medical students has; however, lagged behind, despite the ever increasing importance of reaching out to trainees at the medical school stage for optimal recruitment of the next generation of interventionalists. Given this context, this work was an effort to raise awareness of IR as well as interest in the specialty by medical students, while developing a better understanding of the modern medical student and shedding some insight which students are potential candidates for IR. Following a one-day, state-wide IR symposium, medical student attendees demonstrated significant increased awareness of IR and interest in pursuing the field.

### Are you interested in being a part of Interventional Radiology research?



**FIG 4.** Presymposium and postsymposium medical student responses to the question “Are you interested in being a part of Interventional Radiology research?”. (Color version of the figure available online.)

### Symposium Activities



**FIG 5.** Ranking of the symposium activities considered most helpful to understanding the IR specialty by the medical student participants. (Color version of the figure available online.)

The first lesson revealed by the symposium experience is that the baseline student awareness of IR remains persistently low as demonstrated by several prior studies. The current literature reports a range of 60%–76% of medical students unaware of IR.<sup>1,6–8</sup> In a recent cohort of 259 students at 2 medical schools, 84% of preclinical students, and 62% of clinical students reported fair or poor knowledge of IR.<sup>1</sup> Furthermore, 82% of students who were unsure about a career in IR reported they did not know enough about the field to seriously consider it. Similarly, Misono et al<sup>9</sup> reported that only 30% of students believed that their schools adequately supported IR education. These trends are consistent with our experience revealing only 51% of attendees agreed or strongly agreed when asked if they understood what the work of interventional radiologists entails. These findings are worrisome given that the lack of understanding of this rapidly growing specialty may hinder recruitment of the best candidates and may affect our ability to maintain an appropriate future workforce. Currently, demand for IR procedures is at risk of outpacing the number of practicing interventionalists.<sup>4</sup> It is, therefore, paramount to focus our efforts to integrate IR education in medical school curriculum to help secure the future of IR.

Secondly, the medical school curriculum remains the most important source of educating students about the specialty. In this cohort, approximately 60% of students rated medical school curriculum as the most common way they gained exposure to IR. Other traditional venues of exposure to IR including shadowing an interventional radiologist were the method by which only 20% of the students experienced IR. These findings emphasize the necessity of integrating IR in medical education, particularly early in the training process. For instance, Zimmerman et al<sup>10</sup> introduced a 1-year IR elective with 5 weeks of dedicated IR instruction into the first-year medical school curriculum at their institution and demonstrated a 73% increase in student interest in applying to IR. Other authors such as Nissim et al<sup>2</sup> argue that lesser known specialties should be introduced to medical students as early as possible and conversely caution that low exposure to IR during students' formative years could lead to adverse consequences for the specialty.

In addition to highlighting the role of a formal medical school curriculum, the results of this investigation also demonstrated the powerful effect of offering a dedicated IR symposium immersion experience. Students who attended the IR symposium at our institution both gained understanding of IR as well as exhibited increased interest in pursuing the specialty. Several previous studies involving similar educational events likewise demonstrated increased medical student awareness and interest in a career IR.<sup>9,11–16</sup> A previous survey of second year students found that while student awareness of IR is low at baseline, students tend to be very interested in learning about the specialty when given the opportunity to do so.<sup>4</sup> This survey also revealed that 86% of students found IR awareness important to their

future careers regardless of their specialty of choice, and within this group, 23% found this knowledge might be helpful for deciding when to consult IR. Whether these experiences are helpful for recruitment or education of future referring physicians, the benefits of offering these IR immersion experiences are plentiful.

In addition to its positive impact on the awareness of and interest in IR, the symposium experience also helped the student attendees gain a deeper understanding of the available training pathways. This function of the event is especially important given potential confusion for prospective candidates during the current the transition period during which both traditional IR fellowships following diagnostic radiology residency training and the new IR residency directly succeeding medical school exist. Even following the transition period and the complete phase-out of IR fellowships in 2020, there are nuances in the training pathways for pursuing IR. The new evolving training options include the integrated residency, the independent residency, and the early specialization in IR pathway, which might not be fully understood by medical schools.<sup>17</sup> By clarifying the training experience and the clinical emphasis of IR, events such as this symposium further ensure we recruit the right candidates for our specialty, who are both clinically and procedurally minded.

An important secondary objective of this study was to better understand our target candidates and how their responses to the symposium experience differ. The positive increases in gaining understanding of the field and interest in pursuing it as a career were validated across both genders and level of training. Notably, when the participants were stratified by baseline surgical versus medical specialty interest, the statistically significant gains in awareness and increased affinity for pursuing IR persisted in medically minded students, but not in the cohort of students with surgical interests. This pattern perhaps suggests that there is a potential for the specialty to attract students who might have pursued a nonsurgical specialty despite their interest in procedures given their lack of interest in traditional surgical specialties. Additionally, with the increasing amount of patient contact in IR periprocedurally and in emerging clinics, those interested in nonsurgical specialties might also find the patient-centered care provided by IR appealing.<sup>3</sup> Although this data identifies the subset of medical students with nonsurgical interests as most responsive to such intervention and potential recruitment, this interesting pattern; however, warrants further investigation with larger studies.

Our institutional experience with a targeted symposium suggests that such an event is a successful model for improving medical student understanding of IR while formal medical school curricula evolve to incorporate our rapidly changing specialty. Similar positive experiences implementing comparable educational events have been reported in the literature demonstrating a reproducible experience.<sup>4,9,11–16</sup> Student attendees specifically identified didactic lectures as the most effective element of the symposium. This is consistent with prior work revealing that IR lectures by faculty as one of the most effective and desired means for learning about the field.<sup>1,4,5</sup> Based on student comments, it was also evident that having multiple interventionalists with varying experiences share their roles in patient care, daily work, and educational journey was invaluable in gaining appreciation of the specialty. Although the simulation stations trailed as the second best experience of the symposium, the effectiveness of the lectures is an interesting observation given hands-on workshops represent a popular trend in modern medical education and have demonstrated popularity by IR and other specialty symposia previously described in the literature.<sup>13,18,19</sup>

This work is limited by its nonrandomized and single state design. Additional randomized, multicenter studies with larger samples across the country are needed to gain a deeper understanding of the intricacies of medical student career choice decision-making and effective recruitment methods. Because surveys are a subjective method of assessing opinions, this analysis could have been

inherently influenced by response bias and Likert scale descriptive limitations. Additionally, results of the study should be applied with caution given our student attendee population is subject to selection bias and represents students who are self-selected with presumably some interest in learning about IR. Lastly, while significant gains in IR awareness and interest were demonstrated following the symposium event, longitudinal studies following the participants to later stages in their training are necessary to evaluate enduring responses and provide retrospective feedback on the impact of such events. We attempted to measure commitment to the field by secondarily evaluating student interest in pursuing IR research in addition to their primary interest in the field, although future studies following the participants over time is needed.

In conclusion, this work presents a successful educational model for increasing medical student affinity to the IR specialty. Our results demonstrate the importance of IR symposia for improving medical student awareness of the field and the current training pathways. Findings were validated across both genders and levels of training, and identified the subset of medical students with nonsurgical interests as most responsive to such intervention and potential recruitment. This experience sheds light on the role such events in bridging the gap in medical school curricula by introducing students to the specialty and improving their understanding of IR while simultaneously promoting recruitment for the new IR residency.

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