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Clinical Investigation

Integrity of the National Resident Matching Program for Radiation Oncology: National Survey of Applicant Experiences

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Summary

Radiation oncology applicants report experiencing a high prevalence of behaviors that conflict with written National Resident Matching Program (NRMP) policies, either during or after interviews. Ninety percent of applicants were asked at least 1 question that conflicted with the NRMP code of conduct. Half of respondents felt applicants were often dishonest, and one-third felt match outcome could be improved by deliberately misleading programs. Post-interview communication should be discouraged to enhance fairness for future radiation oncologists.

Purpose: The aim of this study was to examine the experiences of radiation oncology applicants and to evaluate the prevalence of behaviors that may be in conflict with established ethical standards.

Methods and Materials: An anonymous survey was sent to all 2013 applicants to a single domestic radiation oncology residency program through the National Resident Matching Program (NRMP). Questions included demographics, survey of observed behaviors, and opinions regarding the interview and matching process. Descriptive statistics were presented. Characteristics and experiences of respondents who matched were compared with those who did not match.

Results: Questionnaires were returned by 87 of 171 applicants for a 51% response rate. Eighty-two questionnaires were complete and included for analysis. Seventy-eight respondents (95.1%) reported being asked at least 1 question in conflict with the NRMP code of conduct. When asked where else they were interviewing, 64% stated that this query made them uncomfortable. Forty-five respondents (54.9%) reported unsolicited post-interview contact by programs, and 31 (37.8%) felt pressured to give assurances. Fifteen respondents (18.3%) reported being told their rank position or that they were "ranked to match" prior to Match day, with 27% of those individuals indicating this information influenced how they ranked programs. Half of respondents felt applicants often made dishonest or misleading assurances, one-third reported that they believed their desired match outcome could be improved by deliberately misleading programs, and more than two-thirds felt their rank position could be improved by having faculty from their home institutions directly contact programs on their behalf.

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Conclusions: Radiation oncology applicants report a high prevalence of behaviors in conflict with written NRMP policies. Post-interview communication should be discouraged in order to enhance fairness and support the professional development of future radiation oncologists.

Introduction

Prior to the early 1950s, it was common practice for programs to call a medical student and extend an "exploding offer" for a residency position in which the medical student often had only 12 hours to "take it or leave it" (1). The National Resident Matching Program (NRMP) was created in 1952 to alleviate past issues of gamesmanship and pressure experienced by many residency programs and applicants. "The Match" fills available residency spots each year and is the result of an algorithm pairing the rank-ordered preferences of applicants and program directors (PDs). The expressed mission of the NRMP is to "match healthcare providers to graduate medical education and advanced training programs through a process that is fair, efficient, transparent, and reliable" (2).

To best further this goal, the NRMP requires all applicants and PDs to sign a Participation Agreement prior to participating in the Match, which outlines prohibited communication and behavior. Although it is permitted that applicants and PDs voluntarily express their interests in each other, "neither shall solicit verbal or written statements implying a commitment" (3). The NRMP also outlines a strict code of conduct regarding communication between residency applicants and programs which prohibits PDs from inquiring about ranking preferences/intentions, locations of other interviews/applications, age, gender, religion, sexual orientation, or family status. Additionally, PDs are instructed "not (to) solicit or require post-interview communications from applicants … (or) engage in post-interview communication that is disingenuous for the purpose of influencing applicants' ranking preferences." (4) (see Supplementary File E1).

However, due in part to the high degree of pressure on programs and applicants to match successfully, improper communication and behaviors have been documented across specialties (5). Several studies examining the NRMP match in highly competitive fields have demonstrated relatively high rates of possible NRMP policy violations (6-12). To date, there is no information evaluating the integrity of the NRMP match in radiation oncology, a small and highly competitive field. Therefore, we administered a voluntary, anonymous survey study to radiation oncology applicants during the 2012/2013-application season.

Methods and Materials

After review and approval by the Institutional Review Board, a voluntary, anonymous online survey was sent to all applicants who submitted an application in 2012 to the radiation oncology residency program within a single academic medical center with a National Cancer Institute-designated cancer center. Initial invitations were sent by email in April 2013 after the Match results were released on March 15, 2013. Two additional follow-up invitations to participate were sent 1 and 2 weeks after the initial invitation.

Survey instrument

All potential participants were contacted using the email address provided on their application. Applicants were invited to complete a total of 29 questions, collecting information regarding general demographic information, number of away rotations and interviews, whether or not the respondent matched, the number of times specific questions were asked of the respondent or information volunteered to the respondent during interviews, types of contact between the respondent, and programs after their interview, as well as opinions and attitudes regarding the match process. Responses to questions regarding opinions were collected using a 5-point Likert scale. Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at the study institution, supported by an institutional grant. The full survey instrument is included as Supplementary File E2.

Data analysis

Summary statistics were used to describe response rates, demographics, frequency of different types of contact that applicants had with a program (thank-you note, extra emails, second look visits), how often applicants felt pressured or experienced interactions that could be perceived as going against the policy of the NRMP, as well as opinions regarding the match process. Comparisons of categorical variables were performed with Pearson χ^2 test, comparisons of ordinal variables were performed with the Cochrane-Armitage trend test, and comparisons of continuous variables were performed with the Wilcoxon rank sum test. Odds ratios were calculated for factors that could potentially impact likelihood of matching, and 95% confidence intervals (CI) were reported. Variables that reached statistical significance on univariate analysis were included in a multivariate logistic regression model. All analyses were conducted using a commercial statistical software package (JMP version 7;

SAS Institute Inc, Cary, NC), with a P value of $<.05$ denoting statistical significance.

Results

Questionnaires were returned by 87 of 171 applicants, yielding a 51% response rate. Eighty-two surveys were complete and included in the analysis. Twenty-five (30.5%) respondents were female, and 50 (61.0%) were white/Caucasian. Respondents completed a median (range) of 2 (0-5) away rotations, received a median (range) of 15 (0-46) interview invitations, and attended a median (range) of 12 (0-24) interviews. Seventy-four respondents (90.2%) matched into radiation oncology, whereas 8 (9.8%) did not match. Table 1 presents the demographics of applicant respondents by match outcome. Respondents who matched did more away rotations, received more interview invitations, and went to more interviews compared to respondents who did not match. Number of away rotations, number of interview invitations, and number of interviews attended were entered into a multivariate logistic regression model, but none was independently associated with matching into a radiation oncology residency.

Potential or perceived violation of the NRMP code of conduct by the program

Seventy-eight respondents (95.1%) reported being asked at least 1 question in conflict with the NRMP code of conduct. The most common improper question reported was where else an applicant was interviewing. Of the 76 respondents (92.7%) of whom this question was asked, 49 (64%) stated that this made them "uncomfortable" or "very uncomfortable." Other common questions inquired about an applicant's marital or relationship status (63.4%), how an applicant would rank a program (29.3%), and whether an applicant had children or planned to have children (23.2%). Less commonly, applicants were offered incentives such as a future faculty position or a special rotation (8.5%) or asked about their religion (7%). Post-interview ethical dilemmas were common, with 45 (54.9%) reporting unsolicited post-interview contact by programs, and 36% of those contacted reporting pressure to give assurances. Only

Table 1 Demographics and behaviors of 2013 radiation oncology applicant survey respondents by match outcome

Demographic	Matched, n=74	Did not match, n=8	P value*	Odds ratio [95% CI]; P value
Gender, n (row %)			.650	
Males (n=57)	52 (91.2%)	5 (8.8%)		REF
Female (n=25)	22 (88%)	3 (12%)		0.71 [0.16-3.67]; .655
Race, n (row %)			.104	
White/caucasian (n=50)	47 (94%)	3 (6%)		REF
Asian (n=20)	18 (90%)	2 (10%)		0.57 [0.09-4.63]; .569
Black/African American or Hispanic (n=5)	3 (60%)	2 (40%)		**0.10 [0.01-0.92]; .043**
Preferred not to say (n=7)	6 (85.7%)	1 (14.3%)		0.38 [0.04-8.42]; .467
No. of away rotations, median [range]	2 [0-5]	1 [0-2]	**.019**	**2.63 [1.19-6.61]** per additional away rotation
No. of interview invitations, median [range]	15 [3-46]	1.5 [0-8]	**<.001**	**2.13 [1.42-4.58]** per additional interview invite
No. of interviews attended, median [range]	12 [3-24]	1.5 [0-8]	**<.001**	**2.29 [1.51-4.95]** per additional interview attended
Performed "second-look" visits, n (row %)			.403	N/A
Yes (n=6)	6 (100%)	0 (0%)		
No (n=76)	68 (89.5%)	8 (10.5%)		
Wrote thank-you notes to all programs where they interviewed, n (row %)			.772	
Yes (n=55)	50 (90.9%)	5 (9.1%)		REF
No (n=27)	24 (88.9%)	3 (11.1%)		0.80 [0.18-4.16]; .774
Indicated in thank-you note that they would rank a program highly, n (row %)			.450	
Yes (n=47)	43 (91.5%)	4 (8.5%)		REF
No (n=35)	31 (88.6%)	4 (11.4%)		1.38 [0.31-6.28]

Abbreviation: REF = reference.

* Comparisons of categorical variables were performed with the Pearson χ^2 test, and comparisons of continuous variables were performed with the Wilcoxon rank sum test. Boldface type indicates a statistically significant P value $<.05$.

1 respondent reported being offered a position outside the Match, but 15 (18.3%) reported being told their rank position or that they were "ranked to match" prior to Match day with 27% of these individuals, indicating this information influenced their ranking of programs. Table 2 summarizes the applicant experiences during interviews and prior to the Match. No significant differences in prevalence of potentially improper questions or behaviors were observed by gender or ethnicity.

Potential or perceived violation of the NRMP code of conduct by the applicant

Seventy-five respondents (91.5%) sent thank-you notes, including 55 (67.1%) who sent thank-you notes to all programs and 23 (28.0%) who sent thank-you notes only to programs they were interested in. Forty-seven respondents (57.3%) indicated in a thank-you note that they would rank a program highly. Respondents who matched were no more likely to attend a second-look visit, write thank-you notes to all programs where they interviewed, or indicate in a thank-you note that they would rank a program highly (Table 1).

Forty-three respondents (52.4%) "agree" or "strongly agree" that applicants often make dishonest or misleading assurances or statements to programs about their level of interest, but only 30 (36.6%) "agree" or "strongly agree" that those applicants who mislead programs improve their position in the Match, and only 25 (30.5%) "agree" or "strongly agree" that applicants may be justified in making dishonest or misleading assurances or statements to programs. However, 59 respondents (72.0%) "agree" or "strongly agree" that applicants can improve their position by having phone calls or emails made on their behalf by senior faculty (Fig. 1). In order to evaluate for potential bias in responses to these questions by respondents who did not match, opinions of respondents who matched were compared with respondents who did not match and are presented in Table 3. Although the number of respondents who did not match was small ($n=8$), there were no significant differences between the responses.

Table 2 Potential violation of the National Resident Match Program's Code of Conduct by the program as perceived by 2013 radiation oncology applicant survey respondents

	Number (%) responding "yes"	*P* value
Asked where else interviewing	76 (92.7%)	
Asked about marital status		.285
All respondents	52 (63.4%)	
Men	34 (59.7%)	
Women	18 (72.0%)	
Asked about children/intent to have children		.493
All respondents	19 (23.2%)	
Men	12 (21.1%)	
Women	7 (28.0%)	
Asked about religion	4 (4.9%)	
Offered incentives	7 (8.5%)	
Told rank position	15 (18.3%)	
Asked how they would rank the program	24 (29.3%)	
Received an unsolicited phone call/email from a program?	45 (54.9%)	

*Comparisons of categorical variables were performed with the Pearson χ^2 test.

Discussion

This national, voluntary, anonymous survey is the first of its kind to explore the experiences of radiation oncology applicants during the interview and Match process that might be in violation of NRMP policies. More than 90% of respondents reported experiencing behavior that was in violation of the NRMP code of conduct prior to Match day; most commonly, respondents reported being asked where else they were interviewing, but nearly a third of respondents were directly asked how they would rank the program. We found the possibility that more than one-fourth of respondents, most of whom actually successfully matched, were asked to provide information to programs regarding their rank preference very disconcerting and called into question whether some faculty involved in the resident selection process lost their respective bearings in the ethics involved. Less commonly, applicants reported being told their rank position or that they were "ranked to match." Half of respondents reported believing applicants often make dishonest or misleading assurances, with one-third reporting that they believed their desired Match outcome could be improved by deliberately misleading programs. More than two-thirds reported believing that their rank position could be improved by having faculty contact programs on their behalf.

Respondents who matched did more away rotations, received more interview invitations, and went on more interviews than those who did not match, but there were no differences between those who matched and those who did not regarding experiences or opinions regarding dishonest or misleading behavior on the part of applicants to improve their chances of matching.

These data largely fell in line with published NRMP policy violation rates in other specialties. Studies in dermatology report 90% of applicants were asked about interviews at other programs, 19% to 31% of applicants felt pressured to reveal their rank list to programs prior to Match day, and 14% to 17% felt they experienced communication with programs that violated NRMP policy (6, 7). A survey of plastic surgery residency applicants reported 78% of respondents had post-interview contact with a program, and half admitted to exaggerating their interest in a program for the purpose of improving their chances to Match (11). In keeping with these findings, a

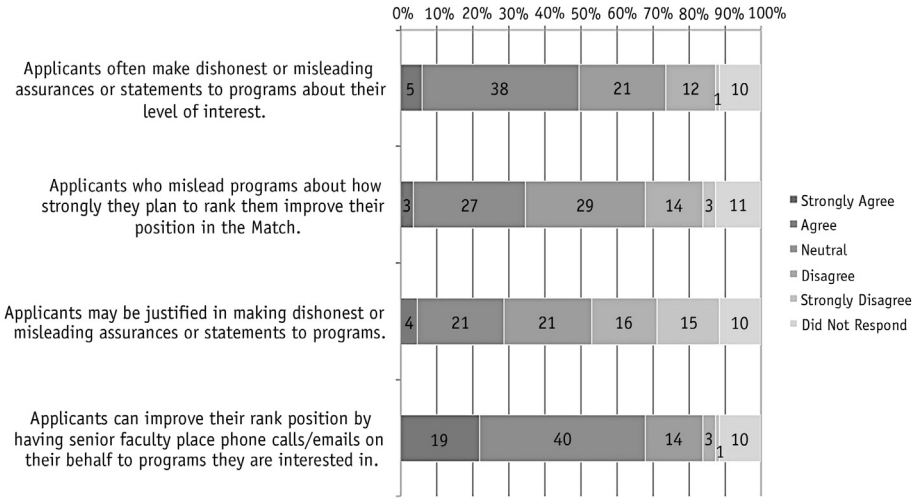

Fig. 1. Beliefs about applicant behaviors prior to the Match and the perceived impact of these behaviors on Match outcome.

survey of obstetrics and gynecology program directors reported 29% of respondents would rank an applicant more favorably if they expressed interest above and beyond a routine thank-you, and 30% reported applicants who did not communicate with a program after the interview were at a disadvantage compared with those who did (12). Conversely, a survey of urology residents and PDs suggested that all the interview and post-interview gamesmanship has led to mistrust on both sides, with 81% of PDs and 61% of applicants "skeptical" when informed they were ranked "high" or "number 1." Although PDs were not surveyed as part of this project, skepticism was certainly evident in the applicant responses. Responses to questions regarding unethical behavior by applicants suggests the prevalence of dishonest or misleading statements by applicants is high and that many applicants feel justified in this behavior as it improves the chances of achieving their desired Match outcome.

One wonders who wins if everyone is playing the game the same way. Additionally, it begs the question as to the motivation behind these deceptive practices, clouding what the NRMP founders built to be a transparent and fair process. Applicants' motivations are clear: they wish to match at their top choice, but more importantly, they wish to match. Anecdotes of prior applicants failing to match after being explicitly told they were a program's number one choice leads applicants to play the field (13). PD's motivations, however, are more opaque. One former member of the NRMP board wrote about the "number needed to fill," and that PDs and chairpersons often tout a low number as a measure of the value and desirability of their program (13). PDs who value this metric may be likely to increase an applicant's rank position if the applicant indicates they have ranked that particular program as their number one and may even be tempted to inquire about their position on an applicant's rank list prior to drafting their own. Some programs are instituting "no call policies" in order to level the playing field and reduce pressure on applicants and the need for dishonest statements on both sides (14). Dishonesty regarding rank intentions is not without consequence, as broken promises made by both PDs and applicants will come to light on Match day. Particularly in a small field such as radiation oncology, but in the broader medical community as well, neither programs nor applicants can afford to gain a reputation as being disingenuous or having questionable ethics (15).

In addition to "number needed to fill," there are other factors PDs consider when trying to assemble an ideal residency class. PDs are not supposed to take factors such as gender, race or ethnicity, religion, sexual orientation, marital status or family status into account when creating their rank lists, however, such issues are often discussed during interviews. Review of the literature suggests marital status and the intention to have children are not brought up uniformly with all applicants, however. Among dermatology applicants, 44% were asked about their marital status, and 19% were asked about their intentions to have children (7). This is similar to the prevalence we found among radiation oncology applicants. We found no differences in the incidence of marital and familiar queries by gender, but this is not the case in surgical specialties in which a female resident taking time off for maternity leave or other parenting issues may have a larger effect on the program. Among urology applicants, 62% of women, compared with 25% of men ($P<.001$) were asked directly if they intended to have children (8). These types of questions not only violate the NRMP code of conduct, they also constitute discrimination. Although it is true that questions regarding an applicant's spouse or family could harmlessly come up in the course of casual conversation during the interview day, a judicious PD and interview committee would not purposefully inquire about such things for fear of making an applicant uncomfortable or having such information bias their rank selections, even unconsciously.

Table 3 2013 Radiation oncology applicant survey respondents' attitudes and opinions regarding the interview and match process by match outcome

Question	Matched (n=74)	Did not match (n=8)	*P* value*
Applicants often make dishonest or misleading assurances or statements to programs about their level of interest.			.252
Strongly agree	5 (6.76%)	0 (0%)	
Agree	34 (46.0%)	4 (50%)	
Neither agree nor disagree	20 (27.0%)	1 (12.5%)	
Disagree	12 (16.2%)	0 (0%)	
Strongly Disagree	0 (0%)	1 (12.5%)	
Prefer not to Respond	3 (4.1%)	2 (25%)	
Applicants who mislead programs about how strongly they plan to rank them improve their position in the Match.			.106
Strongly agree	3 (4.1%)	0 (0%)	
Agree	24 (32.4%)	3 (37.5%)	
Neither agree nor disagree	27 (36.5%)	2 (25%)	
Disagree	13 (17.6%)	1 (12.5%)	
Strongly disagree	3 (4.1%)	0 (0%)	
Prefer not to respond	4 (5.4%)	2 (25%)	
Applicants may be justified in making dishonest or misleading assurances or statements to programs.			.073
Strongly agree	3 (4.1%)	1 (12.5%)	
Agree	19 (25.7%)	2 (25%)	
Neither agree nor disagree	18 (24.3%)	3 (37.5%)	
Disagree	16 (21.6%)	0 (0%)	
Strongly disagree	15 (20.3%)	0 (0%)	
Prefer not to respond	3 (4.1%)	2 (25%)	
Applicants can improve their rank position by having senior faculty place phone calls/emails on their behalf to programs.			.083
Strongly agree	17 (22.3%)	2 (25%)	
Agree	37 (50%)	3 (37.5%)	
Neither agree nor disagree	13 (17.6%)	1 (12.5%)	
Disagree	3 (4.1%)	1 (12.5%)	
Strongly disagree	1 (1.35%)	0 (0%)	
Prefer not to respond	3 (4.1%)	1 (12%)	

Responses to questions regarding opinions were collected using a 5-point Likert scale, with 1 = strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree, 5 = strongly disagree.

* Comparisons of ordinal variables were performed with the Cochrane-Armitage trend test.

Although in the United States the Match has been a rite of passage for generations of medical students, the pathways to graduate medical training are many and varied around the globe. The United Kingdom, for example, has a system that is somewhat similar to the US in which applicants for specialty training prepare an application on a centralized website, and programs offer interviews for open positions. Each applicant is ranked at each interview. After the initial application is submitted, applicants can submit a list of preferences similar to a rank list used in the United States. The applicant's rank by programs as well as the applicant's preference list are used to determine which offers for specialty training positions are made. All initial offers for a specialty training position are issued on the same day, similar to Match day in the US. After an offer is extended, the applicant has 48 hours to respond; however, the applicant may hold the offer if they are not prepared to accept or reject it right away. "Upgrades" are possible if an applicant has accepted or held an offer, but they subsequently receive an offer from a program ranked higher on their preference list (16). Germany, conversely, has no centralized agency or entity that places applicants into post-graduate medical training positions. Applicants must search for open job announcements as they arise and apply individually. There is no standardized start date, and there is no set duration of a post-graduate training appointment. A physician's post-graduate training may take place at one accredited training institution for five or six years, or the post-graduate experience may be accumulated through shorter appointments at multiple institutions (17).

The fact that this survey was both voluntary and anonymous encouraged candid and honest responses from all respondents; however, these same factors increased the probability of response bias. The effect of response bias is seen in the high number of applicants who matched compared to the overall population of radiation oncology residency applicants, as those who matched were

potentially more motivated to respond. We attempted to evaluate for this bias but comparing responses of those who matched and those who did not in order to see if unmatched applicants expressed more negative opinions about the process. Although the number of unmatched respondents in our cohort was small, we found no differences in expressed opinions. Additionally, reported rates of behavior in violation of the NRMP code of conduct may be artificially high as applicants who experienced such behaviors are likely more motivated to respond as well. All optional free-text response narratives provided by respondents are included as Supplementary File E3. Because this survey was anonymous, we could not perform a robust analysis comparing survey responders and nonresponders. However, we compared demographic characteristics of our survey responders with reported characteristics of radiation oncology applicants from other sources. In the 2013 Match, there were 211 applicants for 160 positions offered, and there were 153 matches, leaving 7 unfilled spots and a 73% match rate (18). The percentage of survey respondents who matched was higher at 90.2%. In 2013, 29% of all radiation oncology residents were women (19), which compares favorably to the 30.5% of female survey respondents. Despite these limitations, we feel this survey gives valuable insight into the experiences and opinions of contemporary radiation oncology residents. Chapman et al published that traditionally underrepresented minorities (black/African American, Hispanic, American Indian, Alaska Natives, Native Hawaiian, and Pacific Islanders) made up only 6.9% of radiation oncology residents (20). This is also consistent with our study population, as 6% of respondents to our survey self-identified as being an underrepresented minority.

Conclusions

In conclusion, radiation oncology is both a competitive specialty and a small community in which applicants report a high prevalence of behaviors that conflict with written NRMP policies on communication between applicants and programs. While this analysis could not assess the effects of these questionable communication practices, an unacceptably high percentage of applicants reported feeling uncomfortable. Although The Match has come a long way from the coercive "exploding offers" of the 1950s, these data should serve as a reminder to those involved in residency selection that the policies written and ethical expectations held by the NRMP exist for a reason. Post-interview communication should be discouraged in order to enhance fairness and support the professional development of future radiation oncologists.

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