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Tumor Board Shadowing: A Unique Approach for Integrating Radiation Oncologists Into General Medical Student Education

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Abstract

Purpose: Radiation oncology is often overlooked in US medical school curricula, with few opportunities for most students to learn about the specialty or the value of radiation therapy in cancer care. Tumor boards represent a potential avenue not only to increase students' exposure to radiation oncologists but also to provide a fundamental understanding of the multidisciplinary nature of cancer care and effective collaboration in clinical practice.

Methods and Materials: In this study, we evaluated a novel radiation oncologist—driven tumor board shadowing experience at 3 medical schools in the United States and Canada. A total of 323 first- and second-year medical students participated, of whom 77.4% completed a follow-up survey assessing the effectiveness of the program as a learning tool.

Results: Compared with traditional clinical shadowing, students were more likely to believe that tumor board shadowing provided a similar or better experience in terms of educational content (85%), exposure to a new field (96%), and overall experience (89%). Forty-eight percent of students perceived a greater amount of multidisciplinary collaboration in oncologic care than they thought existed prior to attending. Forty-eight percent of students also felt more competent interacting with oncologists after participating, whereas 21% felt more competent interacting with patients with cancer. Students' perception of increased competence was correlated with the amount of time their assigned physician mentor spent answering their questions after the tumor board ($P < .01$). Second-year medical students also had a more favorable overall experience than first-year medical students did ($P = .04$).

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Conclusions: Multidisciplinary tumor boards can be used effectively as a unique immersive learning opportunity that can be feasibly implemented to improve knowledge of clinical oncology and multidisciplinary care in medical schools and expose students to physicians in smaller fields such as radiation oncology.

Summary

This study demonstrated that a mentored tumor board shadowing program led primarily by radiation oncologists was perceived as being similarly effective as more traditional clinical shadowing experiences in terms of effectively introducing students to multidisciplinary cancer care. The program was feasible to implement at institutions in the United States and Canada in either a mandatory curricular or voluntary extracurricular format.

Introduction

Multidisciplinary cancer management (“tumor board”) conferences are common at academic centers but are infrequently used for the purpose of teaching medical students, although they would expose students to a real-world collaborative process among physicians and give perspective on the multidisciplinary aspects of clinical oncology, experiences that are often lacking in US and Canadian medical curricula.^{1–4} Such an activity may also be particularly valuable to radiation oncologists, given the relative dearth of other opportunities to expose the average student to radiation oncology in most curricula^{2–5} and the American Society for Radiation Oncology’s goal of elevating the profile of the field⁶. However, whether a mentored “tumor board shadowing” activity that is primarily observational and lacks direct patient contact is a valuable educational activity is unclear. We previously demonstrated the feasibility of such a program in a single institution pilot study⁷. This report further assesses its efficacy in a multicenter setting in the United States and Canada.

Methods and Materials

A radiation oncologist—driven tumor board shadowing program for first- and second-year medical students was implemented at 3 institutions with traditional 4-year medical programs: West Virginia University, University of Chicago, and McGill University. Each institution has site-specific multidisciplinary tumor boards (eg, breast, gastrointestinal, head and neck) that take place on a weekly to monthly basis and consist of presentation of patients’ clinical history, pertinent radiologic studies and pathology, and optimal treatment. All students were asked to review a slide deck before attending; the deck contained introductory material covering concepts and terminology that they would be exposed to during the tumor board.

This program was initiated at West Virginia University, where a random selection of first-year students were assigned by an administrator to attend a tumor board in place of another clinical shadowing preceptorship, regardless of their interest in oncology. Based on positive feedback from the first-year students,⁷ second-year students at West Virginia University were also required to attend 1 tumor board of their choice after completing their neoplasia course work. At University of Chicago and McGill University, students attended 1 tumor board of their choice on a voluntary extracurricular basis after the program was advertised

via a class announcement, email, or social media post to first- and second-year medical students. No “read receipts” were used for the electronic communications; however, we believe that all 270 students from University of Chicago and McGill University received the advertisement, and 50 (18.5%) elected to participate. It is expected that a higher percentage of this group had more baseline interest in oncology than students at West Virginia University who were required to participate. At all institutions, it was the intention for all students to attend the tumor board under the supervision of a preassigned faculty member who was available to answer questions after the experience. If mentors did not show up or make themselves available to the students, the students still attended the tumor board, but no further arrangements were made to reassign a mentor to answer questions.

After the tumor board, students were asked to complete a brief online survey about their experience. The complete survey is in Figure E1 (available at <https://doi.org/10.1016/j.ijrobp.2019.03.042>). Likert-type scales were centered at 3 (about the same/unchanged) and ranged from 1 (much worse/less interested) to 5 (much better/more interested). Institutional review board exemption was obtained from each home institution before data collection.

The Mann—Whitney U test and χ^2 proportion test were used for the Likert-type and multiple-choice questions, respectively, to compare the responses of subgroups of students stratified based on their year in school, sex, type of participation, previous exposure to a tumor board, and whether their assigned preceptor met with them. The Kruskal—Wallis 1-way analysis of variance was used to compare Likert-type ratings between students’ interest in pursuing different subspecialties. Spearman’s rho test was used to correlate the amount of time students spent with the assigned mentor after the tumor board with their overall views of the experience.

Results

Between the fall of 2016 and the spring of 2018, 323 students participated in the tumor board shadowing program, of whom 250 completed the postexperience survey (77.4% response rate). Table 1 shows the demographic characteristics of participants. Students’ sex did not affect the probability of voluntary participation ($P = .11$) or the type of tumor board selected for attendance.

Students were more likely to believe that tumor board shadowing was at least as effective as (if not better than) other clinical shadowing experiences in terms of educational content (mean Likert-type rating $3.43 \pm$ standard deviation 0.95), exposure to a new field (3.82 ± 0.86), organizational structure (3.47 ± 0.94), and overall experience (3.44 ± 0.89). The subgroup analyses in Table 2 were notable for a more favorable overall experience among second-year students (vs. first-year students, $P = .04$) and male students (vs. female students, $P = .047$). The involvement of a faculty mentor was also associated with a more favorable view of the educational content ($P = .047$) and overall experience ($P = .02$).

Forty-eight percent of students perceived a greater amount of multidisciplinary collaboration in oncologic care than they thought existed prior to attending the tumor board. Forty-eight percent of students felt more competent interacting with oncologists after attending the

tumor board, and 21% felt more competent interacting with patients with cancer. Students' perception of increased competence (for both of these questions) was correlated with the amount of time the mentor spent answering their questions after the tumor board ($P < .01$). Thirty-one percent of students were more interested in pursuing an oncologic field after participating. Table 2 shows that students who participated voluntarily developed more interest than those whose participation was mandatory. There was no significant difference in interest for any particular subspecialty ($P = .59$), though Table 3 shows that the specialty of the mentor did affect students' interest in radiation oncology or medical oncology ($P < .01$).

In a free-text format, nearly half of the students ($n = 123$) described a greater appreciation for the value of multidisciplinary collaboration as the most important or useful thing learned from this experience. The most common suggestion for improving the program was ensuring that the assigned mentor fulfilled his or her responsibility to act as a liaison between the student and the tumor board ($n = 52$). Twenty-two first-year and 14 second-year students would have preferred more instruction or baseline knowledge before participating because they struggled to keep up with the discussion.

Discussion

Teamwork and collaboration are critical to enabling physicians to provide safe, high-quality, patient-centered care that effectively meets the health care needs of the people^{8–10}. We have shown in this study that tumor boards represent a unique immersive opportunity for students to learn about multidisciplinary clinical oncology in a systems-based format while also observing important principles of teamwork and collaboration in action, leveraging an existing clinical activity for learning purposes. Our results confirm the findings of our previous single-institution pilot study⁷, demonstrate the feasibility of multi-institutional implementation of this learning experience in either a mandatory or voluntary framework, and illustrate ways to optimize the effectiveness of the experience for students. Finally, male and female students were equally interested both in volunteering to participate in tumor board shadowing and in pursuing an oncologic specialty afterward, suggesting that this type of experience could contribute to decreasing the current male predominance of oncologists in North America.^{11,12}

We believe that ideally tumor board shadowing would take place as a mandatory curricular activity during or after preclinical coursework in neoplasia and would include robust participation of a physician mentor. However, understanding that integrating new activities into a medical curriculum or finding administrative time to coordinate the mentors is not necessarily feasible right away, starting with a voluntary experience or including students who have not yet been exposed to coursework in neoplasia is certainly a reasonable approach while building institutional support for the program.

Recruiting effective and reliable mentors may not be easy at all institutions, but we believe it is more achievable when there is institutional support for teaching activities and when departmental leaders strongly promote the importance of teaching among their faculty. Mentoring at a tumor board may actually be more time-efficient than other teaching

opportunities for otherwise busy oncologists. Though any type of oncology-oriented physician could serve as the primary mentor for this experience, radiation oncologists should be particularly interested in taking on this role, given the few other opportunities they have to interact with students and because the key lessons of teamwork, collaboration, and multidisciplinary care are critical to radiation oncologists, who depend on other physicians for appropriate referrals. Similar lessons could also potentially be learned in other settings, such as a multidisciplinary clinic that includes radiation oncologists, though such clinics are much less common than tumor boards at most medical schools and may be limited in either the number of patients or providers from whom a student can learn within a given encounter. In the future we hope to incorporate a pre- and post-test survey to more directly measure what is learned from the experience as we attempt to expand it among additional medical schools.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Participant characteristics

Characteristic	n (%)
Sex	
Male	98 (39)
Female	82 (33)
Not asked	70 (28)
Year of medical school	
First year	112 (45)
Second year	138 (55)
Type of participation	
Mandatory (curricular)	200 (80)
Voluntary (extracurricular)	50 (20)
Choice of disease site of tumor board attended	
Yes	179 (72)
No	71 (28)
Department of physician mentor	
Medical oncology	24 (10)
Surgical oncology	32 (13)
Radiation oncology	78 (31)
Pathology	43 (17)
None (no show)	60 (24)
Other/Student did not know	13 (5)
Amount of time spent with mentor	
0 min	60 (24)
5 min	81 (32)
10 min	51 (20)
15 min	22 (9)
20 min	17 (7)
25 min	2 (1)
30 min	13 (5)
Unknown	4 (2)
Prior tumor board attendance	
Yes	53 (21)
No	197 (79)

Table 2

Mean (standard deviation) Likert-type responses for subgroups of students comparing tumor board shadowing to other clinical shadowing experiences and evaluating students' interest level in pursuing an oncologic specialty after tumor board shadowing*

	Type of participation			Prior tumor board attendance			Medical school year			Mentored experience			Sex		
	Mandatory	Voluntary	P	No	Yes	P	First	Second	P	No	Yes	P	Male	Female	P
Educational content	3.46 (0.96)	3.32 (0.89)	.41	3.45 (0.94)	3.34 (0.96)	.55	3.44 (0.98)	3.42 (0.92)	.72	3.18 (0.98)	3.51 (0.92)	.047 [‡]	3.50 (0.87)	3.27 (0.95)	.1
Exposure to a new field	3.85 (0.89)	3.70 (0.76)	.23	3.89 (0.84)	3.55 (0.89)	.01 [‡]	3.79 (0.87)	3.84 (0.86)	.68	3.72 (1.11)	3.85 (0.77)	.86	3.94 (0.79)	3.64 (0.87)	.02 [‡]
Overall experience	3.46 (0.89)	3.36 (0.88)	.47	3.42 (0.90)	3.49 (0.85)	.33	3.32 (0.88)	3.53 (0.88)	.04 [‡]	3.14 (1.01)	3.53 (0.83)	.02 [‡]	3.60 (0.79)	3.35 (0.96)	.047 [‡]
Interest in pursuing oncology	3.28 (0.74)	3.50 (0.65)	.02 [‡]	3.34 (0.71)	3.26 (0.79)	.77	3.33 (0.76)	3.31 (0.69)	.67	3.15 (0.82)	3.38 (0.69)	.11	3.36 (0.63)	3.33 (0.73)	.97
More competent interacting with patients with cancer, % (n)	23.0% (46) Yes	12.0% (6) Yes	.09	18.3% (36) Yes	30.2% (16) Yes	.06	17.0% (19) Yes	23.9% (33) Yes	.18	13.3% (8) Yes	23.7% (44) Yes	.09	22.9% (22) Yes	15.5% (13) Yes	.21
	41.5% (83) Maybe	40.0% (20) Maybe		41.1% (81) Maybe	41.5% (22) Maybe		38.4% (43) Maybe	43.5% (60) Maybe		26.7% (16) Maybe	46.8% (87) Maybe		38.5% (37) Maybe	47.6% (40) Maybe	
	35.5% (71) No	48.0% (24) No		40.6% (80) No	28.3% (15) No		44.6% (50) No	32.6% (45) No		60.0% (36) No	29.6% (55) No		38.5% (37) No	36.9% (31) No	
More competent interacting with oncologists, % (n)	47.5% (95) Yes	52.0% (26) Yes	.57	44.7% (88)	62.3% (33)	.03 [‡]	49.1% (55) Yes	47.8% (66) Yes	.84	26.7% (16) Yes	55.4% (103) Yes	<.01 [‡]	52.1% (50) Yes	41.7% (35) Yes	.16
	36.0% (72) Maybe	34.0% (17) Maybe		37.6% (74) Maybe	28.3% (15) Maybe		34.8% (39) Maybe	36.2% (50) Maybe		36.7% (22) Maybe	36.0% (67) Maybe		33.3% (32) Maybe	40.5% (34) Maybe	
	16.5% (33) No	14.0% (7) No		17.8% (35) No	9.4% (5) No		16.1% (18) No	15.9% (22) No		36.7% (22) No	8.6% (16) No		14.6% (14) No	17.9% (15) No	

* Multiple-choice questions also assessed whether students felt more competent interacting with patients with cancer and oncologists, respectively, after tumor board shadowing.

[‡] Statistically significant at $P < .05$.

Mean (standard deviation) Likert-type responses assessing students' interest in pursuing each individual oncologic specialty after tumor board shadowing

Table 3

Student interest in field	All participants	With mentor in specialty field	With mentor in any other field	P value
Radiation oncology	3.20 (0.61)	3.64 (0.76)	3.19 (0.53)	<.01
Medical oncology	3.33 (0.63)	3.65 (0.49)	3.29 (0.61)	<.01
Surgical oncology	3.34 (0.66)	3.47 (0.70)	3.34 (0.60)	.40
Pathology	3.14 (0.72)	3.19 (0.59)	3.08 (0.86)	.71