




Assessment of Lymphoma and Other Hematologic Malignancies Training Needs Among Radiation Oncology Residents: a Brief Report

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Abstract

The role of radiation therapy (RT) varies across hematologic malignancies (HM). Radiation oncology (RO) resident comfort with specific aspects of HM patient management is unknown. The International Lymphoma RO Group (ILROG) assessed resident HM training opportunities and interest in an HM away elective. RO residents (PGY2-5) in the Association of Residents in RO (ARRO) database ($n = 572$) were emailed an anonymous, web-based survey in January 2019 including binary, Likert-type scale (1 = not at all, 5 = extremely, reported as median [interquartile range]), and multiple-choice questions. Of 134 resident respondents (23%), 86 (64%) were PGY4/5 residents and 36 (27%) were in larger programs (≥ 13 residents). Residents reported having specialized HM faculty (112, 84%) and a dedicated HM rotation (95, 71%). Residents reported “moderate” preparedness to advocate for RT in multidisciplinary conferences (3 [2–3]); make HM-related clinical decisions (3 [2–4]); and critique treatment planning (3 [2–4]). They reported feeling “moderately” to “quite” prepared to contour HM cases (3.5 [3–4]) and “quite” prepared to utilize the PET-CT five-point scale (4 [3–5]). Overall, residents reported feeling “moderately” prepared to treat HM patients (3 [2–3]); 24 residents (23%) felt “quite” or “extremely” prepared. Sixty-six residents (49%) were potentially interested in an HM away elective, commonly to increase comfort with treating HM patients (65%). Therefore, HM training is an important component of RO residency, yet a minority of surveyed trainees felt quite or extremely well prepared to treat HM patients. Programs should explore alternative and additional educational opportunities to increase resident comfort with treating HM patients.

Keywords Radiation oncology · Hematologic malignancies · Residency training

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Introduction

The role of radiation therapy (RT) in the management of hematologic malignancies (HM) is complex [1], and there are often acceptable systemic therapy-based treatment regimens that do not require RT. Over the last few decades, RT approaches have modernized with smaller treatment fields, optimal imaging, and conformal radiation planning techniques [2] to minimize late treatment-related morbidity.

Radiation oncology (RO) resident exposure in HM RO has been previously reported as inadequate for many residents [3]. However, RO resident comfort with the treatment of specific HM populations or the use of specialized techniques is unknown. Together, the International Lymphoma Radiation Oncology Group (ILROG) and Association of Residents in Radiation Oncology (ARRO) assessed current RO resident HM training opportunities, comfort with HM patient care, and interest in a dedicated HM away elective.

Materials/Methods

For this IRB-exempt study, we utilized the ARRO resident email contact list including all U. S. residents as of December 3, 2018. The survey (Supplementary Information 1), written by HM RO specialists and edited by the ARRO Executive Committee, was distributed electronically through Survey-Gizmo (Boulder, CO). Question number varied due to branching logic. Questions addressed the following: availability of HM training resources, perception of preparedness to treat HM patients, and logistics of an RO HM-focused away elective.

PGY2-5 RO residents ($n=572$) were contacted on January 3, 2019, with 5 follow-up reminders. Question types included binary, Likert-type scale (1 = not at all, 5 = extremely; reported as median [interquartile range]), and multiple choice with options for free response. JMP (Cary, NC) was used to calculate descriptive statistics, Fisher's exact test, and the Wilcoxon rank sum.

Residents were considered to have prior HM RO exposure if they had completed a dedicated elective or if their training program (TP) did not offer a dedicated elective ($n=113$, 112 full survey responses). Residents who had not yet completed a planned dedicated RO elective ($n=21$) were excluded from analyses of HM diagnosis/techniques experience and comfort with RO patient care (Fig. 1).

Results

A total of 134 RO residents completed the survey (131 full, 3 partial responses) for a 23% response rate. PGY2 (11, 8%), PGY3 (37, 28%), PGY4 (41, 31%), and PGY5 (45, 34%) residents responded from programs with 1–4 (10, 7%), 5–8

(45, 34%), 9–12 (43, 32%), 13–16 (20, 15%), and ≥ 17 (16, 12%) residents. Residents reported having dedicated HM faculty (112, 84%) and a dedicated HM rotation (95, 71%); 38 residents (28%) reported a dedicated HM rotation with $> 50\%$ HM patients. The 39 trainees without a dedicated HM rotation included 4 PGY2, 13 PGY3, 10 PGY4, and 12 PGY5 residents.

Residents with prior HM RO exposure reported varying experience with different HM diagnoses (both curative and palliative) and specialized techniques (Fig. 1A). Residents also reported variable levels of preparedness for different aspects of HM patient care (Fig. 1B). Overall, residents felt “moderately” (3 [2, 3]) prepared to treat HM patients. Twenty-four residents (23%) reported feeling “quite” or “extremely” comfortable. Of the 74 residents who had already completed a dedicated HM RO elective, respondents reported feeling “moderately” (3 [3, 4]) prepared to treat HM patients; 23 residents (31%) reported feeling quite or extremely well prepared. For those without a dedicated elective, residents reported feeling “somewhat” (2 [2, 3]) well prepared to treat HM patients; 3 residents (8%) reported feeling “quite” or “extremely” well prepared.

Residents in larger TPs more often reported having dedicated HM rotations (1–4, 30%; 5–8, 56%; 9–12, 77%; 13–16, 90%; ≥ 17 , 100%). Residents in larger programs (≥ 13 vs < 13 residents) and those with dedicated HM rotations (vs without) reported feeling more comfortable advocating for RT in multidisciplinary conferences ($p=0.01$, $p<0.001$, respectively) and overall more prepared to treat HM patients ($p=0.002$, $p=0.0005$, respectively).

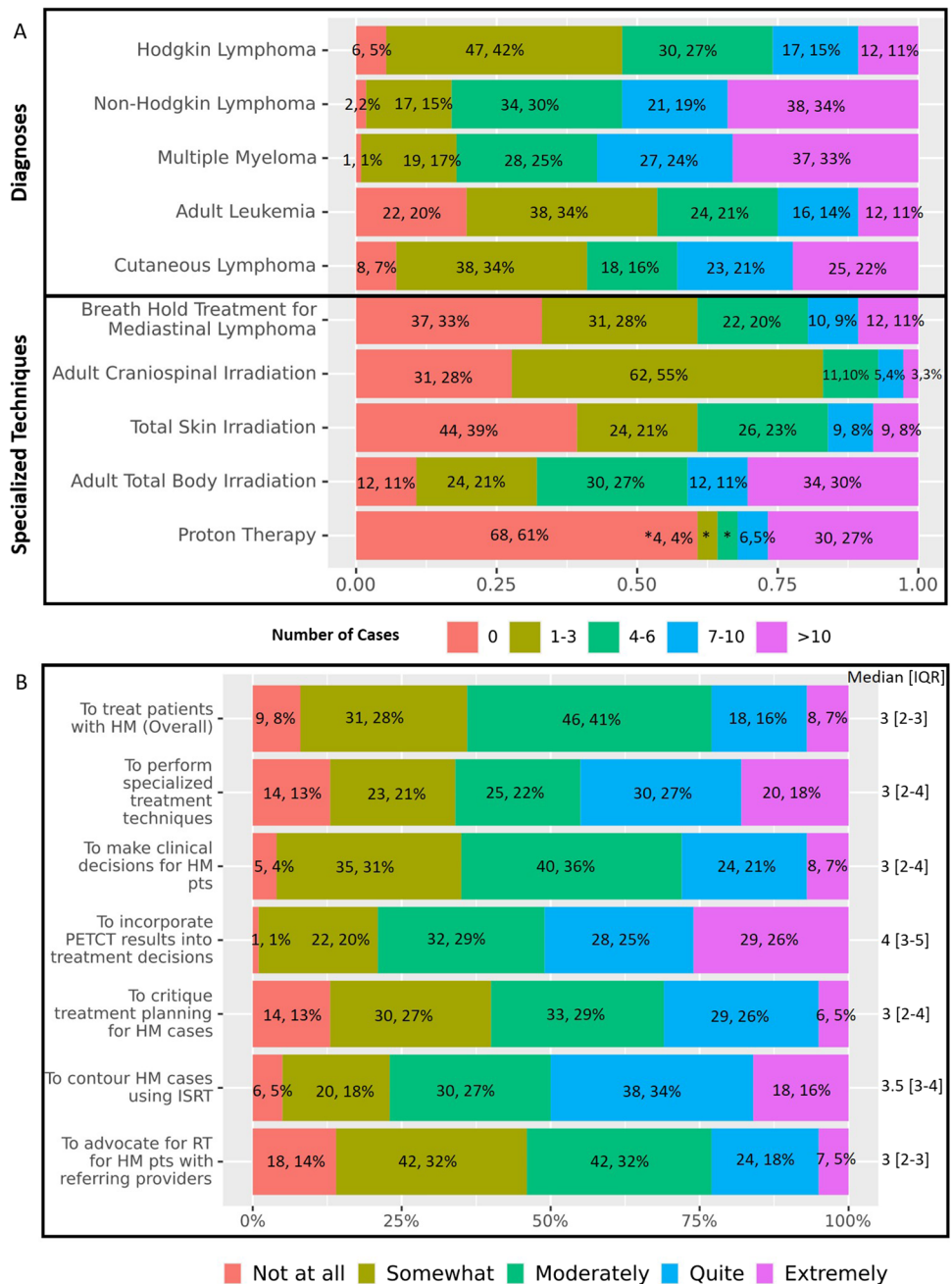
Residents reported that an HM-focused RO away elective would be “somewhat” useful (2 [2, 3]). Sixty-six respondents (49%) were potentially interested in a RO away elective due to disease site interest (16, 25%) or feeling unprepared to treat HM patients (42, 65%). Most (109, 81%) reported housing costs as a barrier to participation. Residents rated hands-on contouring modules (2 [1–4.5]), oral exams (4 [2–5]), and instruction on specialized simulation and treatment techniques (4 [2–5]) as the most worthwhile elective educational activities.

Most commonly utilized HM education resources included informal attending teaching (96, 72%), ILROG guidelines publications (89, 66%), formal residency didactics (85, 63%), board review courses (58, 43%), and textbooks (37, 28%). Residents reported preferring interactive or hands-on learning experiences (68, 51%) compared to visual (31, 23%), audio (18, 13%), or printed (text based) (17, 13%).

Discussion

In this survey study of U.S. RO residents, we found that a minority (23%) of surveyed trainees with prior HM RO exposure reported feeling quite or extremely well prepared

Fig. 1 **A** Trainee reported experience (in numbers of cases) with the treatment of individual hematologic malignancies diagnoses and specialized radiation therapy techniques. **B** Trainee reported comfort with various aspects of hematologic malignancies patient care



to treat HM patients. Prior survey studies have reported on overall resident exposure to HM patient care; however, this is the first report to our knowledge that more deeply explores different aspects of resident experience with HM patient care including exposure to various diagnoses and treatment techniques. Our overall findings are concerning for inadequate resident exposure to HM patient care, and this finding should prompt TPs to consider additional HM-related educational opportunities during residency training.

In the USA, the Accreditation Council for Graduate Medical Education (ACGME) RO program guidelines mandate resident experience with disease sites such as

“lymphomas and leukemias” and instruction in specialized techniques (e.g., total body irradiation). Historically, a minimum number of external beam simulations has been required without further definition of disease site specifics except for pediatrics. Recently, both the Society of Chairs in Radiation Oncology (SCAROP) and ARRO have proposed these changes, and the Review Committee of the ACGME has introduced recommended minimums for non-metastatic cases involving select adult disease sites [4].

Many countries have evaluated the components that comprise quality RO TPs [5–10], yet fewer reports comment specifically on HM training [3, 11, 12]. In prior resident

surveys from 2005–2008, lymphoma, along with sarcoma and pediatrics, was among the disease sites in which residents reported the lowest adequate clinical experience (78–85%), possibly attributed to diverse practice patterns and omission of RT for HM patients [11]. This comfort further decreased in a subsequent 2013–2014 ARRO chief resident survey, where 70% reported adequate exposure to lymphoma. Only 27.3% reported adequate exposure to the specialized technique TSI, while TBI numbers were higher (~70%). Outside of the USA, a German study found that 31% of residents reported “good” or “very good” knowledge levels for lymphoma/leukemia [13], and a Canadian survey found 42% of senior residents perceived having sufficient lymphoma exposure [9].

Although not directly comparable, our results generally revealed lower rates of adequate HM training compared to prior US RO resident surveys, as only ~65% of residents with prior HM RO exposure reported feeling at least “moderately” well prepared to treat HM patients. Only ~30% of residents who had already completed their dedicated HM rotation reported feeling quite or extremely well prepared overall to treat HM patients. Less than 10% of residents without a dedicated elective reported feeling quite or extremely well prepared to treat HM patients, although most survey respondents were PGY4-5 s. As HM patients often have alternative therapy options, it is critical that residents feel confident in their HM training and ability to argue for treatment plans where RT incorporation would be advantageous. A third of residents surveyed had not treated mediastinal lymphoma using breath hold, a technique considered essential by many HM RO experts [2]. Our study demonstrated that larger RO programs provide greater exposure to HM training, likely due to increased disease site-specific faculty and access to specialized treatment techniques.

Specialized training within the mandatory RO curriculum exists [14]; however, “away” electives at outside institutions are uncommon due to administrative and logistical challenges. Our survey respondents noted similar concerns, with participation interest possibly limited by travel and housing costs.

ILROG created an RO resident away elective offered at several high-volume HM RO centers. Despite the interest and apparent need, these rotations are recommended for supplemental training perhaps for more complicated and resource-intensive techniques such as proton therapy or TSI, not as a means for deficient programs to outsource ACGME-mandated minimum requirements for more standard HM training such as ISRT contouring. ILROG away elective efforts have been on hold due to COVID-19. Instead, attention has turned to developing centralized web-based resources such as the ILROG website [15], which includes a trainee reading list, ILROG guidelines links, and didactic lectures by HM RO experts. Although hands-on training has

undeniable benefits, these cost-effective and easily accessible resources are an excellent first step in improving RO HM education for US and international trainees.

Our study is limited by typical survey biases and low response rate. This analysis likely overrepresents the opinions of residents from large programs (12% from programs with ≥ 17 residents in our study compared to 9% of TPs with ≥ 16 residents in the 2021 ACGME report). It is therefore possible that our results overestimate average resident comfort with HM treatment, given that larger programs typically have disease site-specific faculty. Conversely, the inclusion of pre-PGY5 residents without dedicated HM electives may underestimate comfort at the time of graduation. Despite these limitations, our work provides valuable insight into the areas of possible improvement for RO resident HM training. TPs should continue to explore opportunities to increase resident exposure to HMs, possibly through future participation in dedicated HM electives at select programs and/or through online educational activities. Future collaborations between resident-led organizations such as ARRO and TP leadership with ILROG guidance, along with proposed ACGME minimum HMs case number requirements, will be crucial to ensure that trainees are well equipped to care for our HM patient population.

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Author contribution Jenna M. Kahn: survey creation and editing, data interpretation, manuscript writing and editing, final approval of published version.

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Code availability Not applicable.

Declarations

Ethics approval University of Pennsylvania IRB Protocol# 832160. The protocol was determined to meet eligibility criteria for IRB review exemption.

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Consent for publication Not applicable.

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