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Brief Opinion

#WomenWhoCurie: Leveraging Social Media to Promote Women in Radiation Oncology

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Abstract

The proportion of female trainees in radiation oncology has generally declined despite increasing numbers of female medical students; as a result, radiation oncology is among the bottom 5 specialties in terms of the percentage of female applicants. Recently, social media has been harnessed as a tool to bring recognition to underrepresented groups within medicine and other fields. Inspired by the wide-reaching social media campaign of #ILookLikeASurgeon to promote female physicians, members of the Society for Women in Radiation Oncology penned a new hashtag and launched the #WomenWhoCurie social media campaign on Marie Curie's birthday November 7th, as part of their strategy to raise public awareness. From November 6, 2018 until November 10, 2018, the #WomenWhoCurie hashtag delivered 1,135,000 impressions, including 408 photos from all over the world including United States, Spain, Canada, France, Australia, Ireland, the United Kingdom, Mexico, Japan, the Netherlands, India, Ecuador, Panama, Brazil, and Nigeria. Alongside continued gender disparity research, social media should continue to be used as a tool to engage the community and spur conversations to formulate solutions for gender inequity.

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Introduction

The number of female radiation oncology trainees and faculty has been increasing only at a rate of 0.3% per year compared with 1.0% per year for medical oncology fellows and faculty.[1,2] In fact, since 2013, the proportion of female trainees in radiation oncology has generally declined despite increasing numbers of female medical students. As a result, radiation oncology is among the bottom 5 specialties in terms of the percentage of female applicants.[3] Recent research has shown gender disparity in academic radiation oncologist compensation and other unique challenges faced by women in radiation oncology.[4–7] Furthermore, women lag behind men in radiation oncology's highest echelons of leadership.[6,8] However, even though women make up a lower percentage of leadership and senior faculty within the field, when stratified by position and rank, women have productivity metrics similar to those of their male counterparts, which attests to the need for a culture that actively promotes female radiation oncologists.[5,6]

Why should radiation oncologists aim for gender diversity within their physician workforce? Objective data quantify the value of women physicians in medicine. For example, female physicians are more likely to engage in communication that may be considered patient-centered, such as psychosocial counseling and emotionally focused talk, and may spend more time with patients.[8–13] Furthermore, in an era when women outnumber men among medical school matriculants, ensuring that the specialty accesses the full pool of talent when selecting applicants is becoming even more important.[14] Additionally, diversity within groups not limited to the field of medicine has been shown to have a positive impact on overall group performance. Thus, radiation oncology stands to benefit from aiming to increase gender diversity among its physicians.[15]

Social media are increasingly used by physicians and patients to obtain, communicate, and disseminate scientific information. Recently, social media have been harnessed as a tool to bring recognition to underrepresented groups within medicine and other fields. The *This is What We Look Like Campaign* was started by Margo Vallee, MD, an anesthesiologist, and Jessica Gordon-Roth, PhD, an assistant professor of philosophy, who sought to recognize women in traditionally male-dominated fields.[16] From this grassroots campaign came several others, including the #ILookLikeASurgeon movement in 2015 that aimed to challenge the stereotypical view of surgeons as older, white men. The campaign acknowledged today's diverse community of surgeons, including men and women from different backgrounds and cultures.[17]

Society for Women in Radiation Oncology and the First #WomenWhoCurie Day

In 2017, a group of female radiation oncologist in different programs across the United States, including Drs. Ashley Albert, Kaleigh Doke, Laura Dover, Courtney Hentz, Anna Lee, Adrianna Masters, Lindsay Puckett, Genevieve Maquilan, and Virginia Osborn, recognized the great need for a professional organization to address the common issues they faced as an underrepresented group within the field of radiation oncology. With the help of faculty advisors Drs. Parul Barry and Reshma Jagsi, the Society for Women in Radiation Oncology (SWRO) was formed with the vision of a world where women thrive and share equally in the opportunities and authority in the profession of radiation oncology. SWRO's mission is to eradicate gender inequity in the field. To that end, the strategies to achieve our aims include raising public awareness, networking to promote mentorship and sponsorship, expanding the pipeline of women in leadership positions, and leveraging the partnership of our male counterparts as allies.

Inspired by the wide-reaching social media campaign of #ILookLikeASurgeon to promote female physicians, SWRO members penned a hashtag and launched the #WomenWhoCurie social media campaign as part of a strategy to raise public awareness. We hoped that the campaign would serve as a call to action for the field to promote female physicians and take steps to correct the gender disparity for those entering into and currently working in the field of radiation oncology. Using the hashtag #WomenWhoCurie pays tribute to Marie Curie, who in 1903 was the first woman to win a Nobel Prize in Physics, along with her husband Pierre Curie and Henri Becquerel, for their complementary work.

Marie Curie discovered the elements radium and polonium and was the only individual to win a Nobel Prize in 2 different scientific categories. She also developed the theory of radioactivity.[18] The hashtag #WomenWhoCurie simultaneously recognizes her important and inspiring work and the fact that it is continued by female radiation oncologists today. Joined by the American Society for Radiation Oncology and the Radiation Oncology Women's Facebook group, SWRO members shared their campaign with the radiation oncology community.

Enthusiasm for the #WomenWhoCurie campaign caught on quickly, and on November 7, 2018, the 151st birthday of Marie Curie, hundreds of tweets and photos containing the hashtag #WomenWhoCurie were shared on social media, specifically on Twitter, Facebook, and Instagram. Most commonly, photos included female radiation oncologists and other female team members, including physicists, dosimetrists, therapists, and nurses. Many of these photos were accompanied by remarks that expressed women's passion for their work in radiation

Table 1 Top associated hashtags

Hashtag	Total tweets	Contributors	Potential impressions
#WomenWhoCurie	2774	952	4,223,797
#RadOncWomen	1233	423	1,959,845
#RadOnc	599	297	1,035,262
#RadOncDiversity	377	182	638,072
#WomenInMedicine	345	205	590,171

Table 2 Top #WomenWhoCurie influencers

Top 10 influencers by impressions	
Type of account	No. of impressions (1,135,000 total)
Physician (4)	401,000
Organization (3)	122,300
Patient advocate (1)	53,100
Hospital (2)	47,000
Top 10 influencers by tweets	
Type of account	No. of tweets
Physician (6)	94
Organization (3)	52
Patient advocate (1)	7
Top 10 influencers by mentions	
Type of account	No. of times mentioned
Physician (3)	57
Organization (4)	236
Patient advocate (1)	15
Hospital (2)	36

and the patients for whom they care. The humanistic and technological aspects of radiation were showcased, and female radiation oncologists were recognized for the valuable role they play in both.

Many male radiation oncologists participated in the campaign as well by expressing their appreciation and support for women in radiation oncology with their own messages or by retweeting others' photos and posing alongside their female colleagues. Various departments, hospitals, and health care systems across the world demonstrated their support for women by posting group photos recognizing their female radiation oncologists. Inspiring family photos and stories of multiple generations of female radiation oncologists were also included as a part of the celebration. Many tweets expressed a sense of unity among female radiation oncologists across the globe. Although the hashtag was created specifically for this yearly campaign to increase awareness of female radiation oncologists on Marie Curie's birthday, it is interesting to note that the hashtag continues to be used by individuals on Twitter.

Measuring the Impact: Hashtag Analytics

SWRO registered the #WomenWhoCurie hashtag with the Symplur Healthcare Hashtag Project (Symplur LLC, Upland, CA) to facilitate tracking by Symplur.[18] Symplur is a health care social media analytics web-based platform that tracks the following analytics: total tweet counts, retweet counts, impression counts, geo-location, top 10 influencers, associated hashtags, associated words, and word sentiment score. The initial #WomenWhoCurie event was not conceived as a research project, and the data were derived from public information not linked to individual identities and were collected for the purposes of quality improvement of a program. Therefore, review by an institutional review board was not required.

From November 6, 2018 until November 10, 2018, the #WomenWhoCurie hashtag delivered 1,135,000 impressions. This period was chosen for analysis based on peak tweet activity accounted for by Symplur. An impression on Twitter, as defined by Symplur, is the number of tweets from each participant, multiplied by the number of followers the participant has. This value represents the potential views a tweet may receive. The #WomenWhoCurie tweets contained a total of 408 photos and 32 links to articles. The top associated hashtags with the #WomenWhoCure hashtag and the number of potential impressions are shown in Table 1. Per union metrics, the number of potential impressions shows the number of total timelines to which tweets were delivered and counts the maximum total impressions possible for tweets.[19]

Based on Twitter profile information, 55.6% of all tweets were from women and 44.4% from men. Doctors composed the largest group of participants in the campaign with professional profile information and contributed approximately 32% of tweets. Among the top physician contributors, two-thirds were female and one-third were male. The majority of physician contributors were radiation oncologists, but top contributors also included medical oncologists and radiologists. The second largest group of participants was organizations, including hospitals, which contributed approximately 16% of tweets.

Additionally, the success of the campaign was analyzed in terms of top influencers. Symplur classifies a user profile as a top influencer based on 3 domains: number of impressions, number of tweets, and number of mentions. Information about the characteristics of the top 10 #WomenWhoCurie influencers is shown in Table 2. Physicians, both male and female, had the most impact on the campaign based on the number of impressions and the number of tweets. Organizations had the largest impact based on the number of mentions.

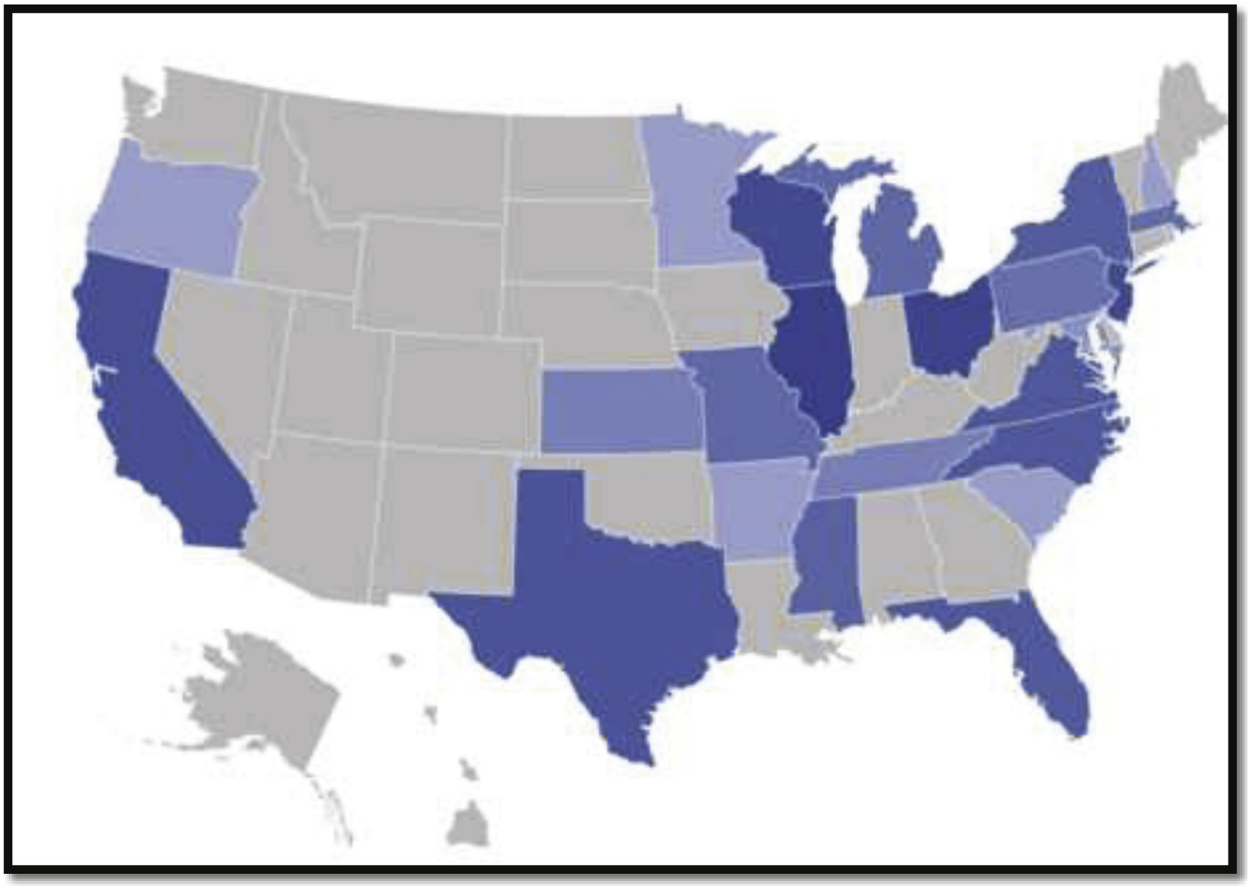

Fig. 1 Participation in the #WomenWhoCurie campaign across the United States. States with participation are shown in blue, with darker shades of blue representing a higher number of total tweets. Location is based on Twitter profile information.

Geo-location information from keyhole.co and Symplur demonstrated participation across continents, including North America, South America, Europe, Africa, Asia, and Australia. A map of participating states from keyhole.co is shown in Figure 1, and a map of global involvement is shown in Figure 2. Location data are not available for all Twitter profiles based on data captured by Symplur; however, some countries represented in the campaign included the United States, Spain, Canada, France, Australia, Ireland, the United Kingdom, Mexico, Japan, the Netherlands, India, Ecuador, Panama, Brazil, and Nigeria. The hashtag was tweeted in English, Spanish, French, and Romanian.

Tweets using the #WomenWhoCurie hashtag were also analyzed in terms of word sentiment. Symplur analyzes tweets for positive and negative sentiment using a health care natural language processing algorithm. This algorithm uses a scaling system of 3 classes (neutral, positive, and negative sentiment) and applies the system to subjective information from health care conversations.[20] Figure 3 shows the sentiment word frequency from physicians who participated in the #WomenWhoCurie campaign, which was overwhelmingly positive.

Implications of the Campaign and Meeting the Challenge

The far-reaching public #WomenWhoCurie campaign as depicted in Figure 4 should encourage radiation oncology departments, organizations, and leaders to critically evaluate mechanisms to more actively foster a culture that encourages the advancement of female radiation oncologists. Concrete steps to address gender inequity may include engaging and supporting female medical students to apply to radiation oncology, ensuring parity between female and male radiation oncologists' salaries, and seeking out female candidates for leadership positions who may not be as visible as male candidates. Of note, these efforts should be applied to all minorities in radiation oncology as well.

This campaign serves alongside rhetoric that challenges the field to meet the ethical obligation to ensure equity and diversity in radiation oncology.[10] Social media served to highlight important issues that are not clearly visible and to connect women and men across the globe in solidarity to reinforce the importance of

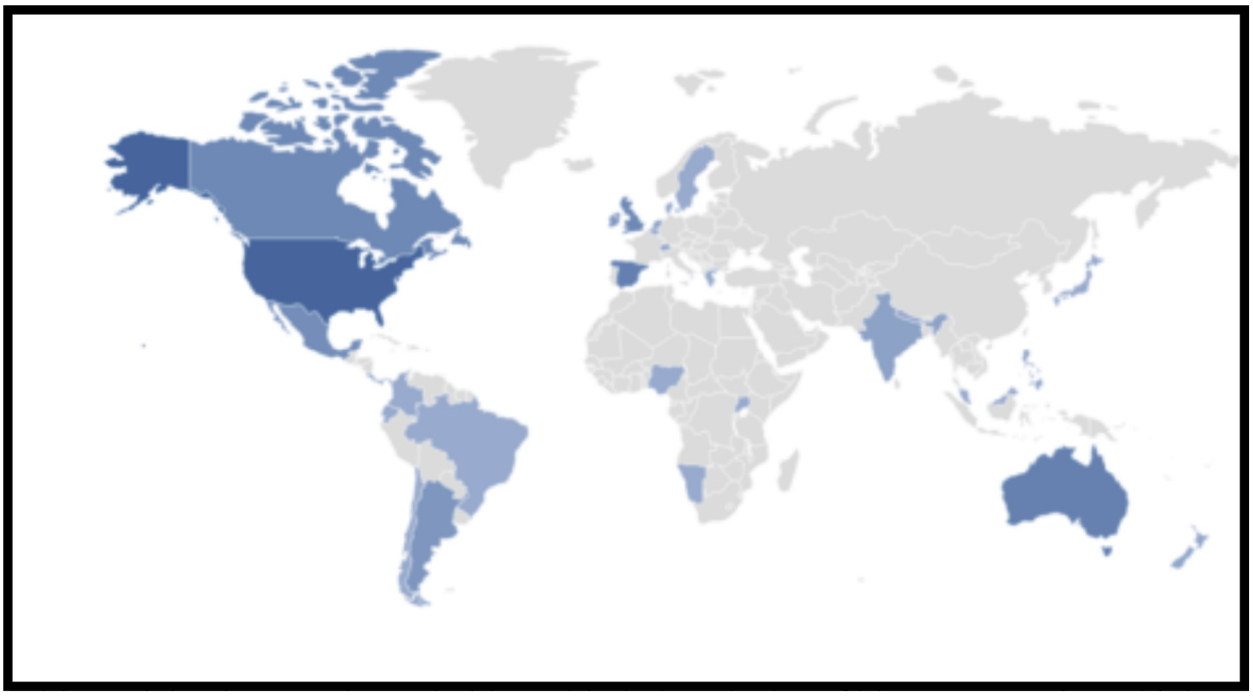

Fig. 2 Participation in the #WomenWhoCurie campaign across the world. Countries with participation are shown in blue, with darker shades of blue representing a higher number of total tweets. Location is based on Twitter profile information.

gender equity and diversity in radiation oncology. By improving women's visibility in radiation oncology, it is hoped that more individuals will take the initiative to address various aspects of gender inequity on both individual and institutional levels. Furthermore, the collaborative and collegial feeling among the women and men who participated in this campaign may nurture group commitment to meet this challenge; the stories shared by women and men in this campaign underscore the importance of doing so.

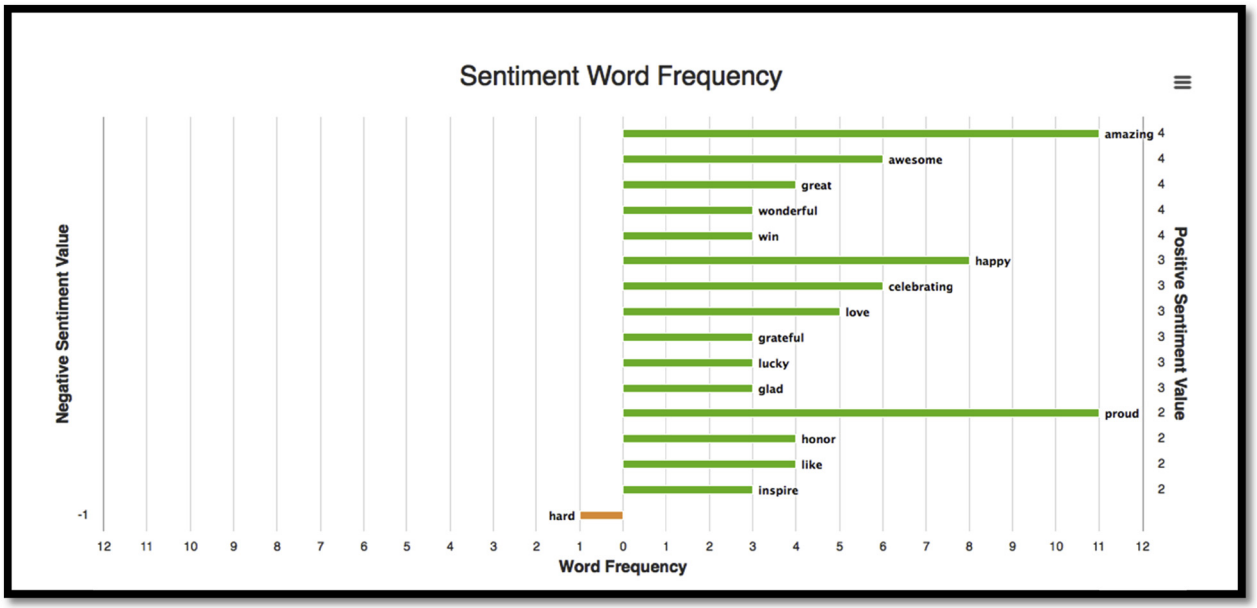

Fig. 3 Sentiment word frequency for #WomenWhoCurie. The sentiment analysis was created using Symplur Signals, which is powered by a natural language processing algorithm that extracts the polarity of healthcare conversations on Twitter.

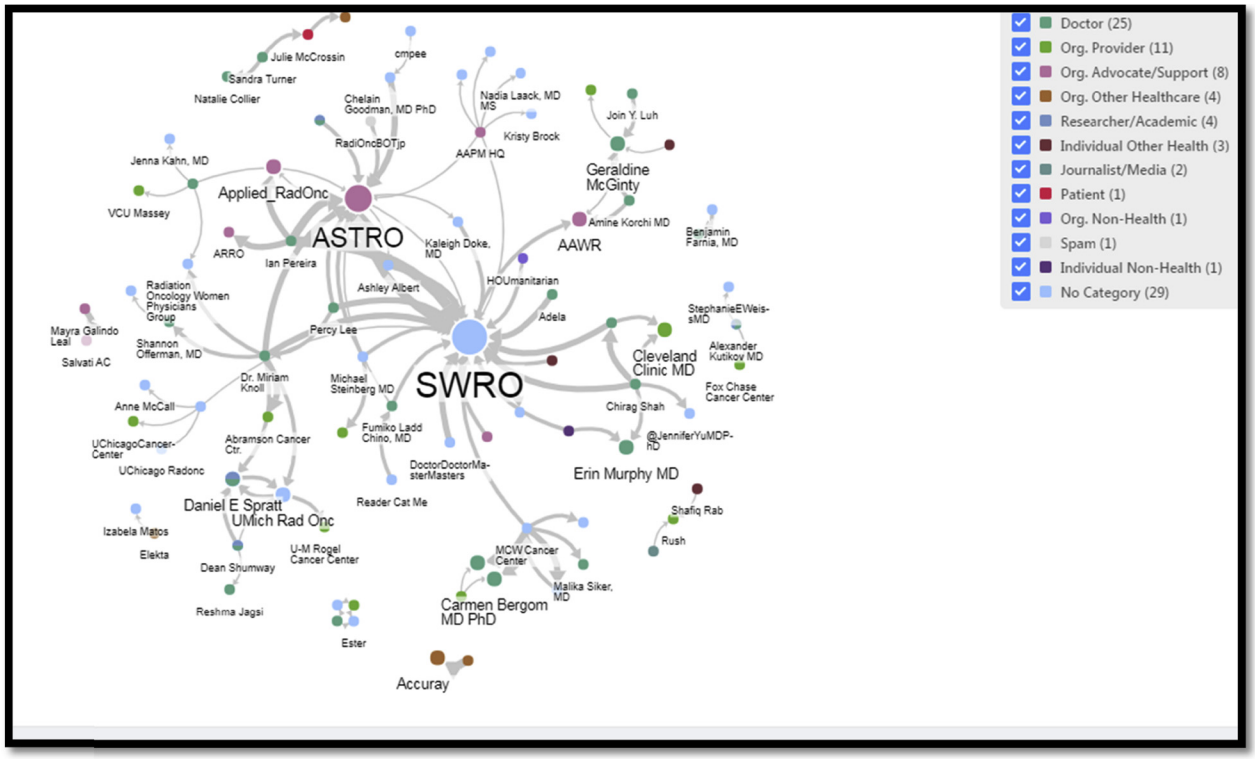

Fig. 4 Network analysis of the #WomenWhoCurie hashtag campaign. This network analysis graph depicts conversation and mention patterns between the most central Twitter users of the #WomenWhoCurie campaign in November 2018. The circles represent each Twitter user who participated. The larger the circle, the more influential the user in the campaign. The lines connecting these circles represent the communications between the individuals, with the thickness of the line representing the frequency of communication.

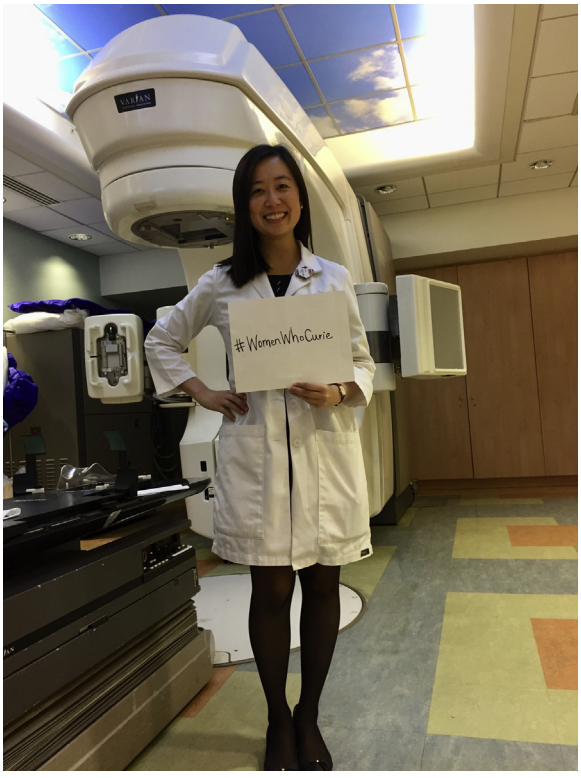

Fig. 5 Dr. Anna Lee, PGY-5 Radiation Oncology Resident, SUNY Downstate Medical Center.

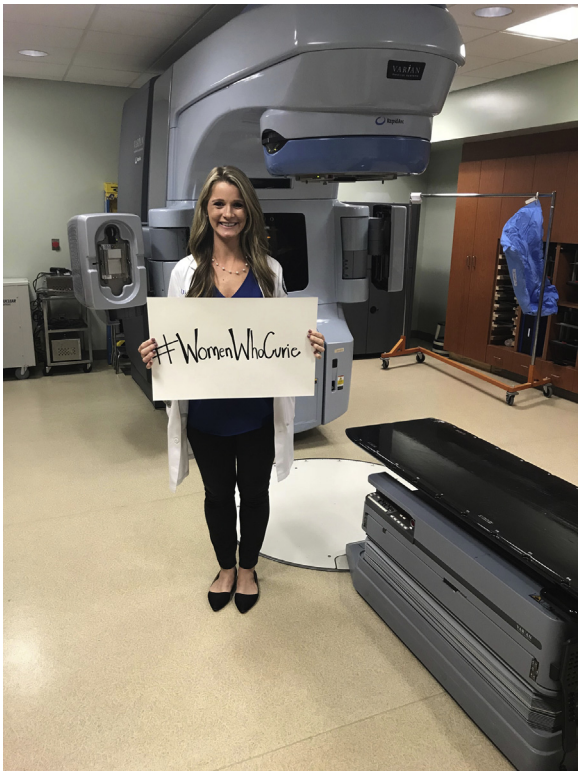

Fig. 6 Dr. Ashley Albert, PGY-4 Radiation Oncology Resident, University of Mississippi Medical Center.

Fig. 7 University of Cincinnati Department of Radiation Oncology.

Fig. 8 Medical College of Wisconsin Department of Radiation Oncology.

Conclusions

The inaugural #WomenWhoCurie Day was the first organized social media campaign to our knowledge to bring attention to gender inequity issues in radiation oncology and highlight the vital contribution women make to the field. The far-reaching movement spanned continents and brought stories and faces to the gender issues quantified in the literature. In addition to bringing attention to these issues, this powerful campaign served to emphasize the vital and unique role female radiation oncologists play in the field of radiation oncology in a positive, collaborative, and inspiring manner, intended to inspire the next generation of bright young women to enter the field.

Given that this year marked the first year that the number of women exceeded that of men among matriculants to U.S. medical schools, the imperative to ensure the visibility of female role models in radiation oncology is profound if the specialty is to draw from the full talent pool. Alongside continued gender disparity research, social media should continue to be used as a tool to engage the community to formulate solutions for gender inequity. By joining our colleagues in many other medical specialties, we can continue to celebrate diversity and champion female physicians (Figs. 5-8).

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