RESEARCH PAPER

Use of social media in radiation oncology: multicenter data from the GOCO Group

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ABSTRACT

Background: The purpose of this study was to explore the usage patterns and profiles of social media (SM) platforms among Radiation Oncologists (RO) and Physicists in the scope of the Catalan-Occitan Oncology Group (GOCO).

Materials and methods: From November 2022 to March 2023, a comprehensive survey was sent to Radiation Oncology professionals within the GOCO group, comprising 31 questions that covered demographics (4) and general inquiries (9), user behavior on social media (7), profile of SM activity (7), and participants' opinions (4) regarding professional use of SM. The survey reached professionals from 12 centers, encompassing 10 in Catalonia and 2 in French Occitania.

Results: The survey achieved a 61.37% response rate (178/290 professionals) with an average age of 41.9 years. 120 (67%) were ROs, and 58 (33%) were Physicists. Instagram led in usage (n = 116), followed by Facebook (n = 107) and Twitter (n = 77). Age correlated inversely with the number of platforms used (Spearman's rank correlation coefficient –0.238, p = 0.001). 28% (n = 42) changed clinical practices based on SM information. A 78.5% (n = 117) didn't counter inappropriate content. Most (71.7%, n = 109) spent < 1 hour daily on professional SM use, however more Physicians exceeded 2 hours compared to Physicists (Cohen's kappa 2 = 0.07). 41.8% (n = 64) weren't emotionally concerned while 22.9% (n = 35) felt overwhelmed by SM overload.

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Conclusions: The study offers valuable insights into the usage patterns, preferences, and attitudes of Radiation Oncology professionals towards SM platforms. This understanding is crucial for optimizing content quality and delivering relevant information, thereby enabling more effective marketing strategies and enhancing emotional management among these professionals.

Key words: social media; social networks; radiation oncology

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Introduction

Social media (SM) is a well-established form of communication in both personal and professional domains. Knowledge in oncology is being rapidly generated and aligns with the immediacy and convenience provided by social networks. The use of SM has experienced significant growth in recent years. Various platforms such as LinkedIn, Twitter, ResearchGate, Facebook, Instagram, Pinterest, YouTube and TikTok, among others, are available, fostering intellectual connections, amplifying oncology information, promoting cancer prevention, and raising awareness about clinical trials [1]. It is also common to utilize instant messaging applications like WhatsApp and Telegram for sharing scientific content and engaging in professional interactions within closed groups.

SM possesses the potential to rapidly disseminate information and reach a broad audience. In the field of oncology, these platforms enable article, conference and other educational material sharing, fostering real-time discussions and opinion exchange. In 2018, researchers conducted an analysis of the social presence of prominent Radiation Oncology societies such as American Society for Radiation Oncology (ASTRO) and European Society for Radiotherapy and Oncology (ESTRO) [2]. The study showed that the majority of posts were related to social events, with only 10% focusing on scientific production and dissemination.

The number of published scientific papers grows higher every year, with an increase of almost 10% over past decades [3]. The constant publishing of data creates additional pressure in healthcare professionals who struggle to keep updated with all the new evidence that is generated every day and complicates the selection of information, which usually comes from SM [4]. Moreover, SM channels generate substantial amounts of big data, making them an enticing target for companies looking to focus their marketing efforts, particularly in the realms of pharmaceuticals, radiotherapy equipment and scientific journals.

Because of this background, we decided to conduct a survey to investigate the usage patterns and profiles of SM platforms for professional and scientific purposes among Radiation Oncology field professionals (specifically ROs and Physicists) from the Catalan-Occitan Oncology Group (GOCO) hospitals. GOCO is a non-profit association that comprises a multidisciplinary network of healthcare professionals in the field of Radiation Oncology in the Catalan (northeastern Spain) and French Occitan (southern France) regions.

Materials and methods

A committee of coordinators was firstly designed, comprising one representative from each participating center. The survey was elaborated by the Radiation Oncology team at Arnau de Vilanova University Hospital in Lleida, and subsequently validated by the coordinators from the different centers.

The target population for the survey consisted of Radiation Oncology professionals, including Physicians and Physicists, from all 12 centers of the GOCO group. These centers encompassed 10 locations in Catalonia (Arnau de Vilanova University Hospital in Lleida; Institut Català d'Oncologia at Hospitalet, Girona and Badalona headquarters; Sant Joan de Reus University Hospital in Tarragona; Hospital del Mar — Parc Salut Mar in Barcelona; Sant Pau University Hospital in Barcelona; Hospital Clínic in Barcelona; Vall d'Hebron University Hospital in Barcelona; Consorci Sanitari de Terrassa in Barcelona) and 2 in French Occitania (Insitut du Cancer de Montpellier; IUCT Oncopole in Toulouse). The survey was

created and distributed in November 2022 using the Google Form platform, allowing for voluntary and anonymous participation by the respondents.

The questionnaire comprised a total of 31 questions, organized into four distinct sections. The first section encompassed general and basic demographic inquiries. The second section delved into user behavior within SM, exploring their interactions and engagement patterns. The third section centered on the profile of social media activity, examining specific characteristics and preferences. The last section asked about participants' opinions and perspectives on professional use of SM (Tab. 1).

The statistics were done using Matlab2022b software with the statistics toolbox.

Results

From November 2022 to March 2023, 178 of 290 professionals completed the survey (61.37% response rate), excluding 8 radiation therapists who accidentally responded. The response rate based on the profession was 62.5% for ROs and Radiation Physicists (90/144 and 50/80 respectively), and 57% for residents (38/66). The participants had a mean age of 41.9 years [standard deviation (SD) 11.6; range 24–68], with the majority being ROs, including attending specialists and resident Physicians (Tab. 2). There were no significant differences in mean age between Physicians and Physicists (41.7 and 42.7 years, respectively, $p = 0.574$). Among the RO par-

Table 1. Summary of the survey questions

Demographic and general questions	Age
	Sex
	Diseases you treat (in case of Physicians)
	Center
	Which social media platforms do you use?
	Do you have a separate professional account from your personal one?
	Is your professional profile public or private?
	How many professional messaging application groups do you belong to (e.g., WhatsApp, Telegram)?
	How many professional network groups do you belong to (e.g., Twitter, Facebook)?
	Do you use any disclaimers in your profile description to separate your professional opinion from that of the institution you work for?
	In which type of institution do you practice?
	How many hours per day do you dedicate to social media for professional reasons?
	During which time of the day do you primarily check social media for professional purposes?
Behavior within social media	What is your activity profile on social media (digital voyeur, content creator, mixed)?
	Do you typically verify information by accessing the full text of an article or the author's presentation?
	If the published information is incorrect or contradicts your own viewpoint, do you actively respond or refute it?
	Do you present patient cases or seek advice from other professionals?
	Are you satisfied with the feedback you receive?
	If there are disagreements, are they expressed appropriately?
	Have you made any changes in your clinical practice based on information/news you have read on social media?
Profile of activity in social media	Have you established professional relationships with professionals from other centers/countries through social media?
	How many oncology professionals do you follow on social media for professional reasons?
	Do you follow media-exposed oncology patients? On which platform?
	Has the COVID pandemic led to increased participation or use of social media for you?
	Do you know if patients follow you on social media?
	Do you provide advice or share your opinion with patients?
	Do you follow oncology journals on social media?
Opinion	Do you believe that interacting with patients could pose an ethical problem or conflict with the patient's regular medical team?
	Do you believe that information on social media could eventually replace attending in-person conferences?
	Do you think a specialty like ours (which has less industry support) should have a greater presence on social media?
	Do you manage the overwhelming amount of information published on social media well?

Table 2. General profile of the respondents and their use of social media

	% (n)
Gender	
Male	46.5% (87)
Female	52.9 (99)
Other	0.5% (1)
Profession	
Radiation Oncologist	50% (90)
Resident in Radiation Oncolgy	17% (30)
Physicist	28% (50)
Resident in Radiation Physics	5% (8)
Country	
Catalonia (Lleida, Tarragona, Girona and Barcelona and metropolitan area)	82.4% (154)
French Occitania	17.6% (33)
Social Media	
No social media	17.6% (33)
Instagram	62% (116)
Facebook	52.2% (107)
Twitter	41.2% (77)
TikTok	9.6% (18)
Youtube (own channel)	8.6% (16)
Other (Linkedin, Reseachgate, Strava)	18.2 (34%)

ticipants, the primary areas of specialization were breast cancer (47.4%, n = 54), followed by prostate cancer (44.7%, n = 51), gastro-intestinal (36.8%, n = 42), and lung cancer (35.1%, n = 40). Instagram emerged as the most frequently used SM platform, followed by Facebook and Twitter (Tab. 2). A to-

tal of 89.9% (n = 142) of the respondents reported working exclusively in the public sector, while 6.9% (n = 11) had a mixed (public-private) work arrangement, and only 3.1% (n = 5) were exclusively employed in the private sector.

There was an inverse correlation between age and the number of SM platforms used. Individuals who did not use any platform had a median age of 50 years, whereas those who used two or more platforms had a median age of approximately 40 years (Spearman's rank correlation coefficient = −0.238, p = 0.001, Fig. 1).

No statistical significant differences were found in the number of SM platforms between Physicists and Physicians (p = 0.849), as well as between professionals from the French Occitania and Catalonia (p = 0.265). However, when considering the type of SM platform, Physicians were found to use Instagram and Twitter more frequently while Physicists tended to use Facebook, although differences were not statistically significant (p-value for Cohen's kappa 2 = 0.46). It should be noted that there were no predominant SM for any specific age group. Furthermore, 41.8% (n = 64) indicated an increased usage of SM since the onset of the COVID-19 pandemic.

Respondents reported utilizing instant messaging applications such as WhatsApp or Telegram. 98% (n = 163) of the participants use these instant messaging groups for professional purposes. Among them, 64.3% (n = 101) are members of up to three groups. Additionally, 20.4% (n = 32) reported being members of more than four groups,
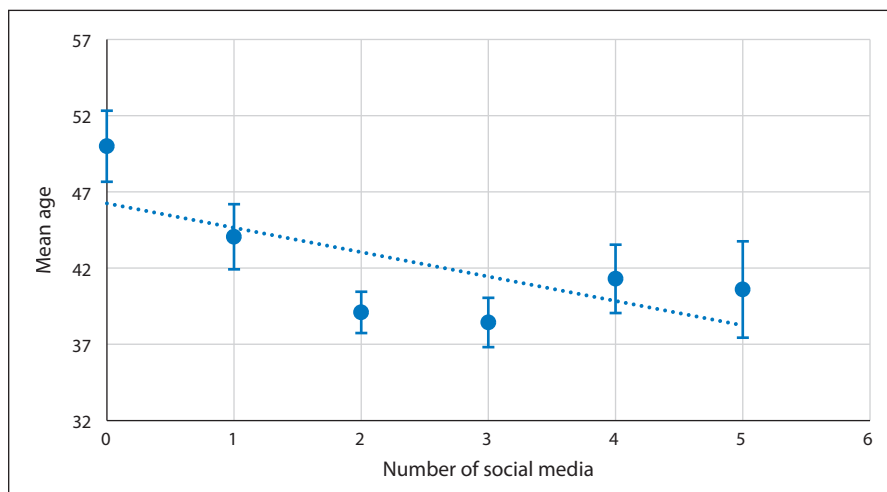
Figure 1. Correlation between age and the number of social media platforms used by survey participants

while 15.3% (n = 24) mentioned not being members of any professional group.

Taking privacy into account, the survey revealed that a majority of respondents (83.2%; n = 129) did not maintain a distinct professional account separate from their personal account. Conversely, a minority of 16.8% (n = 26) reported having a dedicated professional account. Notably, 32.5% of participants disclosed having a public profile rather than a private one. It is worth mentioning that only a small fraction of respondents, 4.5% (n = 7), reported using any disclaimer to dissociate their personal social media activity from their professional life.

Among the respondents, 76.9% (n = 113) identified themselves as "digital voyeur" users, while a small proportion of only 2% (n = 3) considered themselves "content creators". Aligned with the voyeuristic attitude of the majority of respondents, a passive approach was observed when encountering the dissemination of inaccurate or opposing information. In such instances, 78.5% (n = 117) chose not to respond or deny the content, whereas 20.8% (n = 31) took action. Notably, 35.6% (n = 53) claimed to actively verify and delve deeper into the information by accessing full texts or papers shared on social networks by other professionals. In contrast, 61.1% (n = 91) admitted to occasionally checking the content, while a merely 3.4% (n = 5) stated that they just looked at the headlines.

Regarding the connections established with other professionals on social networks, half of the respondents did not utilize SM platforms to openly seek advice from their peers. However, 39.3% (n=59) sought professional advice privately or within closed groups. Merely a small percentage of 10% (n = 15) has openly raised their doubts or questions on SM platforms.

We also asked about the subjective perception of time (in hours per day) that they spend on SM with a professional purpose. The majority, accounting for 71.7% (n = 109), reported spending less than one hour. However, when comparing the time devoted to SM between Physicians and Physicists, Physicians reported spending more time overall. Specifically, a trend was observed among those who spent more than one to two hours per day (p-value for Cohen's kappa 2 = 0.07), as depicted in Figure 2.

54.5% of professionals reported checking SM outside of work. The preferred time to check them was reported to be during coffee breaks (41.5%, at work), followed by at night (25.2%, before going to sleep) and in the evening (17%) (Fig. 3). There were no differences between Physicians and Physicists (p-value for Cohen's kappa 2 = 0.58), as well as between French Occitania and Catalan professionals (p-value for Cohen's kappa 2 = 0.84).

In terms of professional relationships established through social networks, 37.5% (n = 56) stated that they had connected with professionals from other countries. Additionally, 22% (n = 33) followed at least 5 healthcare professionals on social networks, with 16.7% (n = 25) following between 5–10 healthcare professionals, 14% (n = 21) following more than 10 professionals, and 19.3% (n = 29) following more than 20 professionals.

No clear age-related trend was detected regarding the number of professionals followed on social networks, and no differences were found between Physicians and Physicists based on geographical location. 71.5% (n = 88) expressed satisfaction
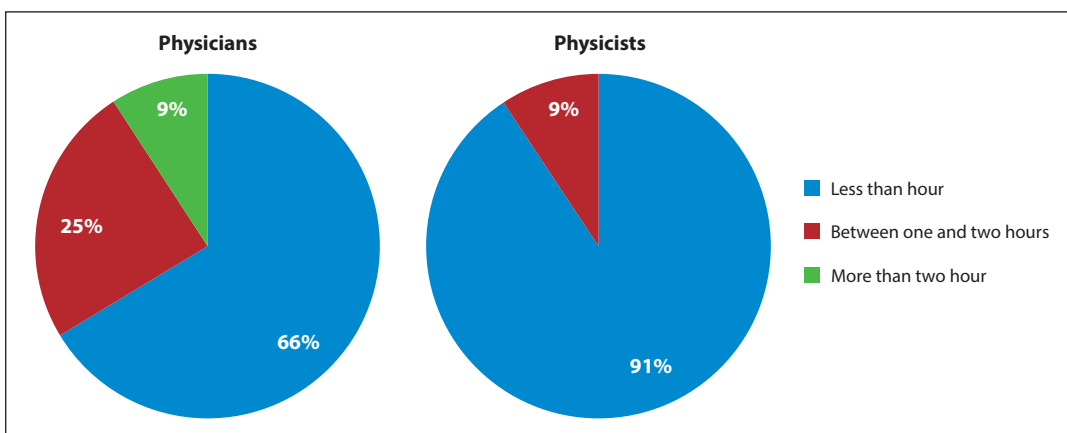

Figure 2. Time spent on social media for professional purposes per day by physicians and physicists
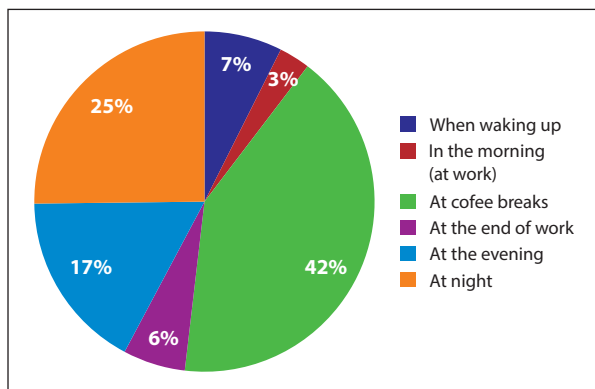
Figure 3. Distribution of social media usage by time of day among survey participants

with the feedback they received in SM, compared to 28.5% (n = 35) who felt disappointed. Among the respondents, 20.9% (n = 27) mentioned receiving disagreements in a constructive manner, and 35.6% (n = 46) indicated that this happened most of the time. Conversely, 41.1% (n = 53) either did not know or were not concerned about this issue.

A total of 28% (n = 54) of the survey participants have made changes to their clinical practice as a result of information shared on SM. Additionally, a majority of 57.9% (n = 88) of the respondents actively follow cancer journals through social media platforms. Moreover, 71.9% (n = 110) believe that the immediate availability of information from oncology congresses in SM will not replace the need for in-person attendance. However, 24.8% (n = 38) believe that this would depend on the type of congress or meeting. Among this group, 56.1% (n = 26) stated they would no longer attend an international congress, 43.6% (n = 19) a regional one, and 29.3% (n = 12) a national one. Moreover, 78.3% (n = 119) of the respondents believe that Radiation Oncology should have a stronger presence on SM.

The majority of professionals do not follow patients on SM. Only 15.5% (n = 23) do so, with none of the surveyed professionals from French Occitania following influencer patients on social networks (p-value for Cohen's kappa 2 = 0.07). On the other hand, 9.3% (n = 14) of the respondents were aware of being followed by patients, while 24% (n = 36) were uncertain or did not know. The majority, comprising 66.7% (n = 100), stated that they were not followed by any patients.

When asked about providing advice to patients via SM, 94% (n = 142) indicated that they would never do so. However, 4.6% (n = 7) mentioned occasionally providing advice if asked. 55.2% (n = 85) expressed that such an interaction on SM could pose an ethical problem. However, 27.9% (n = 43) stated that they had not considered this issue and 16.9% (n = 26) did not perceive it as a problem.

Regarding the emotional management of professionals of the information posted on SM, 41.8% (n = 64) of the respondents expressed no concerns. However, it is important to note that 22.9% (n = 35) admitted feeling overwhelmed by the information overload that is posted.

Discussion

SM have transformed communication and become a platform for addressing patient needs in the field of Oncology, as highlighted in a recent review published in the Journal of Clinical Oncology [5]. Our survey, conducted among working Radiation Oncology professionals with an average age of 42 years, revealed that social networks play a significant role in their day-to-day professional activities. The commonly utilized SM platforms include Instagram, Facebook, and Twitter, and there is an inverse correlation between age and the number of social networks used. The use of SM among young professionals and medical residents has been the subject of a study in which Facebook and Instagram were among the most commonly used platforms. Furthermore, the surveyed young physicians emphasized that SM provided them with convenient access to valuable educational content, contributing to their professional development [6]. In 2019, a survey on the status of the medical profession in Spain, promoted by the Medical College Organization and the General Council of Official Medical Colleges [7], revealed that Facebook was the most widely used social network (53.7%), followed by Instagram (30.5%) and Twitter (25.3%). Among individuals under 40 years of age, Instagram was the most popular SM. On the other hand, Medscape recently conducted a survey among 1,077 French physicians who were members of the Medscape/Univadis websites between October and December 2021 [8]. The survey revealed that Facebook was the most popular social network

among participants (63%), followed by messaging platforms like WhatsApp or Telegram (58%), and other platforms like Instagram (24%), Twitter (13%), and Linkedin (5%). Both studies show similar preferences in SM, which aligns with the absence of observed differences in our survey between Catalonia and French Occitania.

We observed some distinctions between Physicists and Physicians, with Physicists showing a higher usage of Facebook, while physicians tend to favor Instagram and Twitter. Additionally, Physicians tend to spend more time on SM compared to Physicists. We found it intriguing to observe some differences between Physicists and Physicians. One possible explanation for the trend of Physicists to use Facebook more frequently is that many Physicists in the scope of GOCO use this platform to join specialized groups and Radiation Physics communities. In addition, the greater amount of time devoted to SM by ROs can be explained by the higher level of direct and frequent interactions of Physicians with patients, families, and other healthcare professionals that allows engagement with a broader audience and provides educational resources [9]. It is worth noting that Radiation Physicists are well acquainted with working online, as evidenced by the integration of Internet-based computer technologies that facilitate novel applications in radiation dose delivery [10].

The current survey has also brought to light certain concerns regarding privacy on social networks: the majority of respondents fail to differentiate between personal and professional accounts, and when it comes to work-related matters, no disclaimers are utilized to delineate personal content from that associated with their institutional affiliation. However, most respondents do not follow patients on SM and assert that they do not offer advice through these platforms. In 2017, a group of French ROs [11] proposed a set of best practice recommendations for the use of SM in Radiation Oncology. These recommendations were: to create an online professional identity and adopt a similar behavior to their offline behavior with medical ethics and professionalism, to strictly separate the personal and professional profiles, to respect the doctor–patient relationship and patient confidentiality, to respect the institution's SM policy, to adapt to existing communities to integrate and enrich them and to adapt to the etiquette of the network and use appropriate terms.

Another noteworthy aspect for discussion is that the majority of respondents exhibit a passive behavior on SM and refrain from actively engaging in debates or addressing false or misinterpreted comments. It is important that the information disseminated through SM be appropriate and accurate, considering that numerous patients turn to the internet to address their inquiries and concerns as an expression of empowerment and self-governance in the decision-making process. Inadequate information holds the potential to result in severe consequences, risking patients' well-being or enticing them to make erroneous therapeutic choices. In this context, a recent review has outlined the principles for comprehending and mitigating misinformation within the domain of Radiation Oncology [12]. Contrariwise, only one-third of the respondents verify the accuracy of published scientific information by delving into the full text. Nevertheless, it is worth noting that over half of the respondents actively follow scientific journals on social networks, highlighting the significance of this platform as a valid means of dissemination within the field of Radiation Oncology. Additionally, a significant majority of the respondents believe that Radiation Oncology should establish a stronger presence on social networks.

It is also important to mention that SM is playing an increasingly relevant role in the metrics of scientific publications and could be used for academic promotion in the future. For instance, the analytics company *Symplur* has proposed an objective measure to determine the impact of an individual in the SM environment over a one-year period. The tool is called *Healthcare Social Graph* and has even been compared to the *h-index* in a cross-sectional study [13]. The analysis of nearly 300 Twitter profiles of users with an index in Google Scholar showed a weak but statistically significant correlation [Spearman's correlation coefficient ρ 0.1979 ($p < 0.001$)] with *h-index*, raising the question of whether SM activity could ultimately become a marker of academic activity.

Recent data from *Hootsuit Analytics* (a centralized dashboard platform to manage multiple SM networks), shows that in Western Europe 79% of the population are active users of SM [14]. The total duration of internet use (all devices) is 6 hours 11 minutes with a median age of users of 45.1 years. The reported average daily time spent on SM,

1 hour and 54 minutes, aligns with the subjective perception of time spent using SM by Radiation Oncology professionals as indicated in our study. In addition, in the present survey, more than a half of professionals use SM with a professional intent outside of work. This led us to open a debate on the importance of establishing boundaries, selecting designated times to disconnect from SM, and fostering a healthier work-life balance among Radiation Oncology professionals. How to manage the influx of information from internet to protect mental and emotional well-being and maintain a healthy balance between online and offline life is important. While the majority of participants answered as not being concerned about information overload from SM, it is worth noting that 23% expressed being overwhelmed. Trying to consume and process too much information can cause mental fatigue and stress, as well as "how and when" may influence in psychological well-being in a positive or a negative manner [15].

Conclusions

SM has become a powerful tool in spreading medical knowledge among healthcare professionals. To the best of our knowledge, this is the first multicenter study focusing on SM user profiles and objectives in the field of Radiation Oncology, involving Physicians and Physicists from two different countries, encompassing both specialists and professionals in training. Scientific information from SM is influencing daily practice and Radiation oncologists and Physicists use SM for professional purposes, mainly to seek information and build professional relationships.

Further investigation is required to enhance SM presence, promote data sharing, foster meaningful debates, and encourage responsible use through education. Understanding the usage patterns, preferences, and opinions of SM among professionals is essential for improving the quality of shared content. Addressing privacy concerns, combatting inaccurate information, distinguishing personal from professional profiles, and setting usage limits to enhance work-life balance, are topics that need to be improved upon. Additionally, the abundance of information on SM can lead to professionals feeling overwhelmed, necessitating comprehensive exploration to develop effec-

tive measures for enhancing emotional management in Radiation Oncology.

Finally, by gaining in-depth insight into the SM habits of professionals, healthcare sponsors can effectively recognize and connect with their specific target audience in SM platforms, leading to more focused and impactful marketing strategies.

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