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Evaluation of the quality and impact of online learning through the SAFE EUROPE webinars

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ABSTRACT

Introduction: The SAFE EUROPE project, a European-funded project, addressed educational gaps of Therapeutic Radiographers/Radiation Therapists (TR/RTTs) by offering a series of free webinars. This study aimed to assess the quality of these webinars and their impact on professional practice.
Methods: Data collection involved two methods: an automated feedback form administered after each webinar, supplemented by a survey disseminated through social media. The collected data encompassed attendance statistics, participants' professions and geographic locations, webinar quality assessment, the acquisition of new knowledge and skills, the application of this newfound knowledge in practice, and the likelihood of recommending these webinars. Descriptive statistics and thematic analysis were used to analyse the quantitative and qualitative data, respectively. Ethical approval for the study was obtained.
Results: 11,286 individuals from 107 countries participated in 18 webinars. Despite 72.7% being radiographers, a diverse array of professionals attended the webinars, including medical physicists, oncologists, radiologists, and academics. Remarkably, 98.7% of respondents rated the webinar quality as either good or excellent. The average rating for the likelihood of recommending these webinars to colleagues was 8.96/10. A substantial proportion of respondents expressed agreement or strong agreement that the webinars enhanced their knowledge (85%) and skills (73%). Furthermore, 79% of participants indicated that the webinars motivated them to change practice, with 65% having already implemented these changes. The insights from open-ended questions corroborated these findings.
Conclusion: The webinars effectively achieved the aim of the SAFE EUROPE project to enhance practice by increasing knowledge and skills. Participants overwhelmingly endorsed the quality of these webinars.
Implications for practice: Webinars represent a cost-efficient training tool that reaches a global audience and various radiography/radiotherapy professions. The development of additional webinars is strongly recommended.

Introduction

Radiotherapy is a vital component of cancer treatment, and it requires highly skilled professionals to deliver accurate and safe treatments.[1] Therapeutic Radiographers/Radiation Therapists (TR/RTTs) are responsible for operating complex equipment, planning and delivering treatments, and monitoring patients' responses.[2–4] To maintain their capabilities and keep up to date with the latest advancements in the field, radiographers need access to continuous professional development (CPD) opportunities. Traditionally, CPD involved attending conferences, workshops, and in-person training sessions. However, with the rapid evolution of technology alongside the restrictions on meeting face-to-face during the COVID pandemic, webinars have emerged as a convenient and cost-effective alternative for delivering CPD.[5,6]

Webinars are online seminars that allow participants to interact with presenters and peers in real-time. They can be accessed from anywhere with an internet connection and a device capable of streaming video and audio.[6,7] Webinars can cover a wide range of topics, from technical updates to clinical research, and they can be customised to meet the specific needs of the target audience.[7–9]

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Several studies have shown that webinars can be an effective tool for delivering CPD in healthcare professions, including nursing, pharmacy, and medicine.[7,10,11] They are also more cost-efficient than in-person training[12–14] and can easily reach audiences that are geographically spread,[14] such as in this study.

A systematic review of the literature assessing the effectiveness of webinars in promoting student achievement concluded that, in general, the webinars were slightly more effective than the control (face-to-face classroom lecturing). However, the effectiveness of these varied according to the webinar itself, learning objectives, and participant demographics.[15]

The COVID-19 pandemic increased the use of webinars as an education tool.[16,17] In a study by Al-Ahmari et al. (2021),[16] even though most attendees (75%) were satisfied with webinar sessions, some participants preferred face-to-face events. Ismail et al. (2021)[17] argue that webinars should complement (not replace) traditional face-to-face learning.

Despite the potential benefits of webinars, little research has been done to assess their effectiveness in developing the knowledge and skills of radiotherapy professionals. This paper aims to fill this gap by evaluating the effectiveness of the Safe and Free Exchange of EU Radiography Professionals across Europe (SAFE EUROPE) project webinars as a CPD tool to increase the knowledge and skills of radiotherapy professionals. In addition, the advantages and disadvantages of this approach are examined alongside the impact on the participants' knowledge and skills.

The overall aim of the SAFE EUROPE project was to create a series of webinars to close "educational gaps" of TR/RTTs. These knowledge and skills gaps were identified from research studies performed as part of this research project, including educational gaps in linear accelerator practice,[18,19] digital skills,[20] green skills,[21] and advanced roles.[22] The research also took the perspective of different stakeholders, with an emphasis on the patients' perspectives.[23] Three webinar series and a total of 18 webinars (Table 1) were created in collaboration with the European Federation of Radiographers Societies (EFRS) Radiotherapy Committee. All recordings are available at www.safeeurope.eu or www.efrs.eu/webinars.

The SAFE EUROPE project received an ERASMUS + grant. As part of this grant, a final assessment was performed to evaluate the impact of the project. This study aimed to assess the quality and impact of the SAFE EUROPE webinars. As such, the research questions this study answered were: (1) "Were the webinars of good quality?" and (2) "What was the impact of the content delivered during the webinars on knowledge, skills, and practice?". The participants' perception of "quality" was measured using a direct question but complemented by the measurement of other components that reflect "quality" such as: accomplishment of participants' expectations, effective presentations, presentations pace, and likelihood of recommending the webinars to colleagues and students.

Methodology

The research used was a quantitative, descriptive, deductive, cross-sectional design using both primary and secondary data. Two sources of data were collated to answer the research questions: i) data collected by the GoToWebinar platform (secondary data) and ii) a questionnaire distributed to attendees after the end of all webinars (primary data) aiming at evaluating the impact of the webinars on participants' practice.

GoToWebinar feedback survey

The GoToWebinar platform (GoTo, Boston, USA) was used to deliver the webinars. This platform collected attendance data, and an automatic evaluation/feedback survey was sent to the participants at the end of the webinar. This short feedback survey asked attendees to respond to five statements using a five point Likert scale (strongly agree, agree, neutral, disagree, strongly disagree) as follows:

1. The webinar delivered the information I expected to receive
2. The subject matter was presented effectively
3. The pace of the webinar was satisfactory
4. As a result of the webinar I gained new knowledge applicable to my work
5. I plan to apply what I learned in this webinar

These were followed by a question delivered using a 10-point scale asking 'How likely is it that you recommend this webinar to a friend or colleague' and finally, a free text question for the submission of "Any other comments".

Table 1
List of webinar episodes as part of the SAFE EUROPE project.

Episode code	Episode title
Season 1–2021 EFRS Radiotherapy Webinar Series (part of the SAFE Europe Project)	
S1E1	Use of pharmaceuticals in the management of radiotherapy side-effects (Part 1)
S1E2	Use of pharmaceuticals in the management of radiotherapy side-effect (Part 2)
S1E3	Daily, monthly, and annual QA procedures for linear accelerators
Season 2 (part 1) - Risk Management in Radiotherapy	
S2E1	Software-related accidents in radiotherapy: what can we learn from them?
S2E2	Mini-series incident cases: Incident learning in proton therapy in MAASTRO: An incident due to wrong table density.
S2E3	Proactive risk analysis in practice: Failure Mode and Effects Criticality Analysis (FMECA)
S2E4	Mini-series incident cases: Who is the patient on the treatment table? Learning from a clinical case
Season 2 (part 2) - Radiotherapy Special Techniques and Technologies	
S2E5	Radiobiology of hypofractionation
S2E6	Organisation of a brachytherapy unit: technology, safety, and patient-centred care
S2E7	Proton Therapy: theories and practices from a radiographer's perspective
S2E8	Online adaptive MRI guided radiotherapy – changing role of the therapeutic radiographer
S2E9	Stereotactic RadioSurgery (SRS) and Stereotactic Body Radiation Therapy (SBRT)
S2E10	An introduction to Surface Guided Radiotherapy: Improving patient positioning, comfort and treatment accuracy
S2E11	Clinical Trials: From finding the right question to implementation
Season 3–2022 EFRS Radiotherapy Webinar Series (part of the SAFE Europe Project)	
S3E1	Management and leadership in healthcare and radiotherapy
S3E2	How can healthcare professionals contribute to a sustainable world? Developing TR/RTTs green skills
S3E3	Digital content creation by TR/RTTs: developing digital skills
S3E4	Patient advocacy for TR/RTTs

This data collected for other purposes (internal assessment) is considered secondary data — using this data allowed the researcher to reach some conclusions on participant satisfaction. However, more information was needed to draw a complete picture of the quality and impact of the webinars.

Impact questionnaire

To complement the data automatically collected by the webinar platform, a self-designed questionnaire was distributed to evaluate the perceived quality of the webinars and their impact (increase in knowledge/skills and change in practice).

Questionnaires are useful to survey a large number of attendees and achieve a broader understanding of the quality and impact of the webinars.[24] Questionnaires are also easy to distribute and analyse since they allow a measure of participants' perception of the quality and impact of the webinars in a quantifiable way.

The target population included all attendees to the SAFE EUROPE webinars. However, not all of the population was accessible. The survey was disseminated through mailing lists (to members/associates who previously agreed to receive information) and social media of the SAFE EUROPE partners and their associates. This recruitment strategy aimed to reach as many webinar attendees as possible. This sampling strategy is considered a non-randomised convenient sampling since people who access the SAFE EUROPE partner's social media will be "conveniently" invited to answer the survey (therefore, this may not include all attendees). However, since the webinars were primarily promoted through social media and mailing lists, the attendees' population and the population invited to answer the survey should closely overlap.

The questionnaire was tested for face-validity by asking two experts (one expert in radiotherapy and one expert in European grants impact assessment) to rate each item in the questionnaire with regards to its relevance to the aims of the research. The Content Validity Indexes (CVI) were calculated following Zamanzadeh et al.'s (2015) methods[25]: all items had an I-CVI of 1, resulting in a S-CVI/Ave and an S-CVI/UA of 1.

A test-retest was performed with a 5-person sample to determine the intra-rater reliability of the tool. The Cronbach's Alpha[26] a two-way mixed, absolute agreement, average measures Interclass Correlation Coefficient (ICC)[27] was calculated for each quantitative question. The average Cronback's Alpha and ICC for all questions was of .905 and .901, respectively, showing an average excellent agreement.[26,27] The statement if "I plan to use the knowledge/skills gained in my practice" had the lowest Cronbach's Alpha (.588) and ICC (.625) which reflect a moderate agreement. All other questions achieved ICCs above .750 showing good or excellent agreements. All questions were kept the same following the validity and reliability testing.

Data analysis

Descriptive statistics were used to describe the participants sample and their perceptions of the quality and impact of the SAFE EUROPE webinars. Thematic analysis was used to identify the themes that emerged from the open questions, allowing further exploration of the perceptions quantified in the close-ended questions.

Ethical considerations

The data automatically collected by the GoToWebinar platform was anonymised before being analysed. The submission of feedback was voluntary, anonymous, and was not a requirement to receive a certificate (to avoid coercion).

A participant information sheet (PIS) was provided before the start of the questionnaire. Participation was voluntary and opt-in only (i.e. invitations were shared online, and participants had to voluntarily click the link to participate). The survey was also anonymous. Other than the participants' roles, no other personal information was asked.

For both the webinar platform and the questionnaire, none of the questions requested sensitive information. There was no risk of harm to the participants. Participants could withdraw from the study at any time before submission of the survey/feedback without repercussions. Due to anonymity, it was impossible to withdraw the answers after submission, but participants were informed of this. Since participation was voluntary, consent was implied when participants submitted the feedback/questionnaire. All data was kept safely protected by passwords and using encrypted servers. Only the named investigators had access to the data. This study was approved by the Institute of Nursing and Health Research Ethics Filter Committee at Ulster University, UK (reference number: FCNUR-21-080).

Results

GoToWebinar feedback survey

Details from the GoToWebinar registration and attendance reports for all 18 episodes have been compiled in Table 2. Most attendees across the 18 episodes were TR/RTTs (72.7%) and the detailed distribution is presented in Table 3. The attendance rate corresponds to the percentage of registrants that attended the live webinar. The results of the post-webinar short feedback surveys are shown in Table 4.

Impact questionnaire

The impact study obtained 167 responses. Thirteen (n = 13, 8%) respondents did not attend the SAFE EUROPE webinars and were excluded, achieving 154 valid responses. 43.3% (n = 65) identified themselves as TR/RTTs or radiographers (RT/MI/NM), the target audience of the project. However, a variety of professionals replied to the impact questionnaire, as seen in Table 5.

In the questionnaire, 63% (n = 97) responded that they have roles as educators. Each webinar was attended by between 33% and 59% (between 50 and 91) of the respondents to this impact study.

The questionnaire participants included RT staff from 56 countries from Europe, Africa, Asia (North, Central, and South) America, and Oceania. The distribution of the attendees' countries can be seen in Fig. 1 and Table 6.

Quality of the webinars

68.8% (n = 105) of the participants considered the webinars to be of excellent quality, and 98.7% (n = 152) considered them either good or excellent. No one considered them to be poor or very poor, as seen in Fig. 2.

The open question also indicated that the webinars were of good quality. Responses included: "The quality of the information taught by the professionals was excellent. I learned a lot of new concepts and topics to implement in my RT department" (P27 – CR – TR/RTT). They also confirmed that the subjects were "Very well explained" (P69 – CA – MNG) and that "they were presented nicely" (P92 – AE - STU). The code used for the participants includes the participant number, the country of practice (ISO 3166 two-letter country codes – www.iso.org/iso-3166-country-codes.html) and the profession code from Table 5.

Table 2
GoToWebinar data from all episodes.

Episode Code	Registrants (n)	Attendees (n)	Attendance rate (%)	Countries (n)	Average interest rating[a]	Recording views[b]
Season 1–2021 EFRS Radiotherapy Webinar Series (part of the SAFE Europe Project)						
S1E1	358	218	61	46	87	110
S1E2	473	305	70	49	88	80
S1E3	633	330	52	60	88	139
Season 2 (part 1) – Risk Management in Radiotherapy						
S2E1	1085	649	60	55	85	204
S2E2	777	525	68	59	96	75
S2E3	707	449	64	52	Not available	68
S2E4	787	477	61	56	91	129
Season 2 (part 2) – Radiotherapy Special Techniques and Technologies						
S2E5	759	453	60	64	89	204
S2E6	650	383	59	51	96	93
S2E7	773	411	53	58	96	80
S2E8	840	465	55	61	96	102
S2E9	596	382	64	56	96	149
S2E10	834	509	61	59	97	142
S2E11	607	320	58	59	97	51
Season 3–2022 EFRS Radiotherapy Webinar Series (part of the SAFE Europe Project)						
S3E1	372	219	59	51	95	63
S3E2	380	209	55	44	96	20
S3E3	369	190	52	40	88	30
S3E4	286	159	56	37	96	36
Total	**11,286**	**6653**	-	-	-	**1775**
Mean	627	370	59	53	93	99

[a] The GoToWebinar interest rating is a statistic that gauges attendee interest during the webinar. It is taken from an equation that evaluates each attendee's interactions on a scale of 1–100. For individual attendees it is calculated based on their: completion of optional registration data, percent of answered poll questions, dialogue via the chat or Q&A, attentiveness (percent of time GoToWebinar was the primary window on their screen, percent of survey questions completed, attendance length, and number of inputs (polling, Q&A, survey).
[b] Recording views as of August 1st, 2023.

Table 3
Professions attending across the 18 episodes – from the GoToWebinar data.

Profession	Overall attendance (%)
Therapeutic Radiographer/Radiation Therapist	43.8
Diagnostic Radiographer/Radiological Technologist	25.8
Medical Physicist	8.8
Student	8.2
Nuclear Medicine Radiographer/Nuclear Medicine Technologist	3.1
Other	2.6
Teacher	2.4
Researcher	1.9
Radiologist	1.5
Nurse	1.2
Radiation Oncologist	0.8

Table 4
Post-webinar short feedback survey results across the 18 episodes.

Question	Mean rating
1. The webinar delivered the information I expected to receive	4.39[a]
2. The subject matter was presented effectively	4.40[a]
3. The pace of the webinar was satisfactory	4.25[a]
4. As a result of the webinar, I gained new knowledge applicable to my work	4.25[a]
5. I plan to apply what I learned in this webinar	4.18[a]
6. How likely is it that you recommend this webinar to a friend or colleague?	8.96[b]

[a] 5-point scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).
[b] 10-point scale (from 1 = highly unlikely to 10 = highly likely).

133 participants (86%) recommended the webinars to their colleagues (Fig. 3). Additionally, most respondents (n = 129, 84%) agreed or strongly agreed that these webinars are also suitable for students (Fig. 4).

Table 5
Distribution of professions of the attendees answering the impact study, including codes used for the quotes.

Profession	n	%	Code used for the quotations
Therapeutic Radiographer/Radiation Therapist	41	27.3	TR/RTT
Radiographer (RT/MI/NM)	24	16.0	RAD
Medical Physicist	22	14.7	MP
Diagnostic Radiographer/Radiological Technologist (including Nuclear Medicine)	20	13.3	DR/NM
Academic	9	6.0	ACA
Student	7	4.7	STU
Manager	5	3.3	MNG
Researcher	5	3.3	RES
Engineer	3	2.0	ENG
Physician	3	2.0	MD
Quality Manager	3	2.0	QM
Radiation Safety Officer/Expert	3	2.0	RS
Other	2	1.3	OTH
Regulator	2	1.3	REG
Nurse	1	0.7	NUR
TOTAL	150[a]	100%	

[a] 4 respondents did not answer this question.

Usefulness and impact of the webinars

Most respondents indicated that they either “agree” or “strongly agree” with the statements that the webinars increased their knowledge (n = 131, 85%) or their skills (n = 113, 73%), respectively. With a minority disagreeing or strongly disagreeing with these statements (n = 13, 8% and n = 15, 10%, respectively). This can be observed in Figs. 5 and 6.

From the open questions, one of the themes arising was that the webinars were useful both as an update and as a review of topics learned before: “they were an update and reminder of those topics we deal with at the clinic” (P11 – MX – MP); “useful to refresh concepts” (P38 – ES – DR/MN); “Webinars are important to get knowledge of new technologies and to revive the memory of those

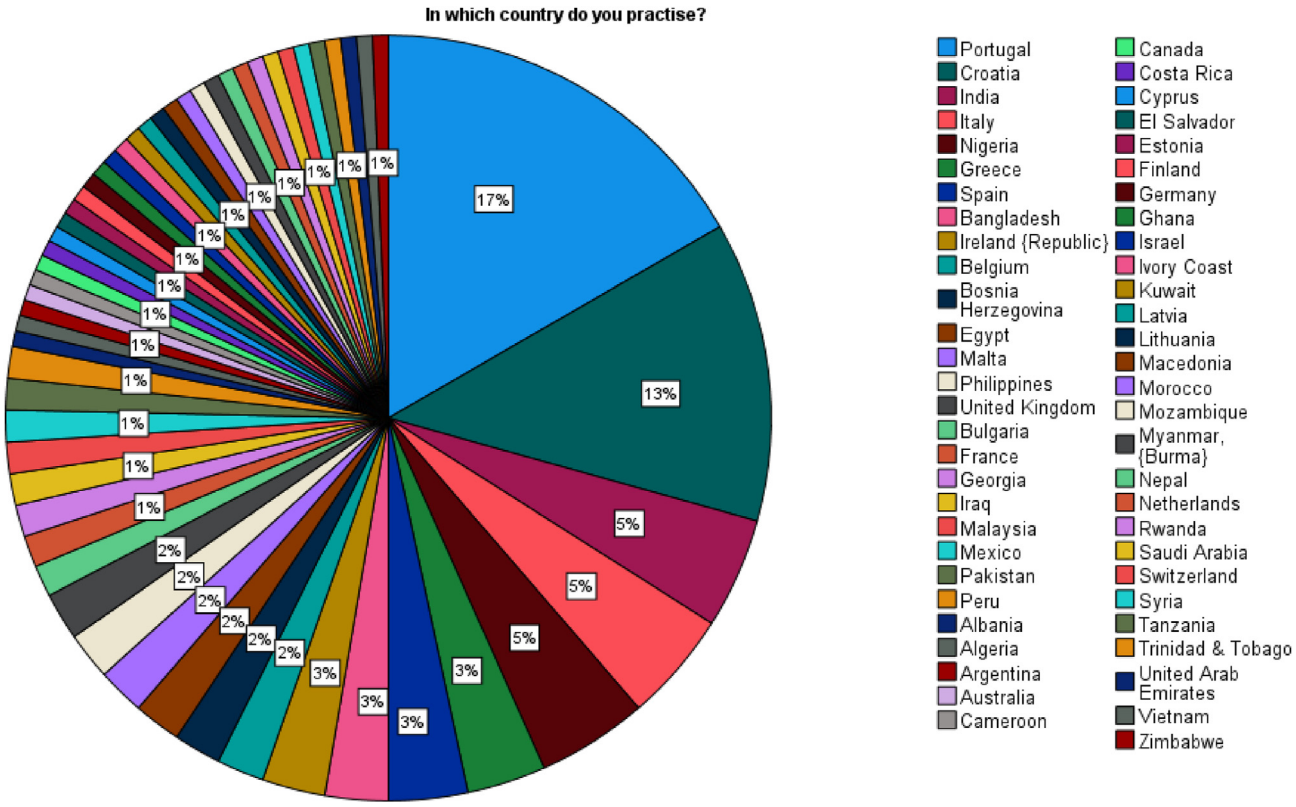

Figure 1. Country distribution of the attendees answering the impact study.

Table 6
Country of residence of the attendees answering the impact study.

"In which country do you practice?"		
Country	Frequency	Percent
Portugal	25	16.7
Croatia	19	12.7
India	7	4.7
Italy	7	4.7
Nigeria	7	4.7
Greece	5	3.3
Spain	5	3.3
Bangladesh	4	2.7
Ireland {Republic}	4	2.7
Belgium	3	2.0
Bosnia Herzegovina	3	2.0
Egypt	3	2.0
Malta	3	2.0
Philippines	3	2.0
United Kingdom	3	2.0
Bulgaria	2	1.3
France	2	1.3
Georgia	2	1.3
Iraq	2	1.3
Malaysia	2	1.3
Mexico	2	1.3
Pakistan	2	1.3
Peru	2	1.3
Albania	1	0.7
Algeria	1	0.7
Argentina	1	0.7
Australia	1	0.7
Cameroon	1	0.7
Canada	1	0.7
Costa Rica	1	0.7
Cyprus	1	0.7
El Salvador	1	0.7
Estonia	1	0.7
Finland	1	0.7
Germany	1	0.7
Ghana	1	0.7
Israel	1	0.7
Ivory Coast	1	0.7
Kuwait	1	0.7
Latvia	1	0.7
Lithuania	1	0.7
Macedonia	1	0.7
Morocco	1	0.7
Mozambique	1	0.7
Myanmar, {Burma}	1	0.7
Nepal	1	0.7
Netherlands	1	0.7
Rwanda	1	0.7
Saudi Arabia	1	0.7
Switzerland	1	0.7
Syria	1	0.7
Tanzania	1	0.7
Trinidad & Tobago	1	0.7
United Arab Emirates	1	0.7
Vietnam	1	0.7
Zimbabwe	1	0.7
Total	150[a]	100.0

[a] 4 respondents did not answer this question.

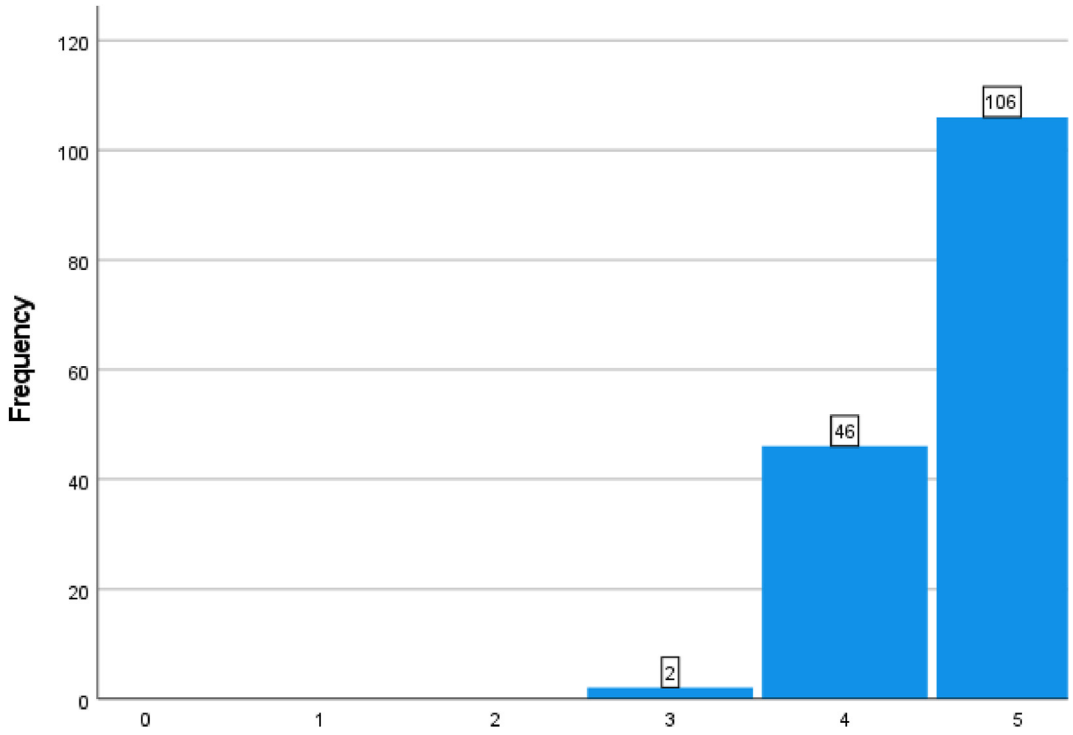

Figure 2. Rating of the overall quality of the webinars. Rating between 1 (very poor) and 5 (excellent).

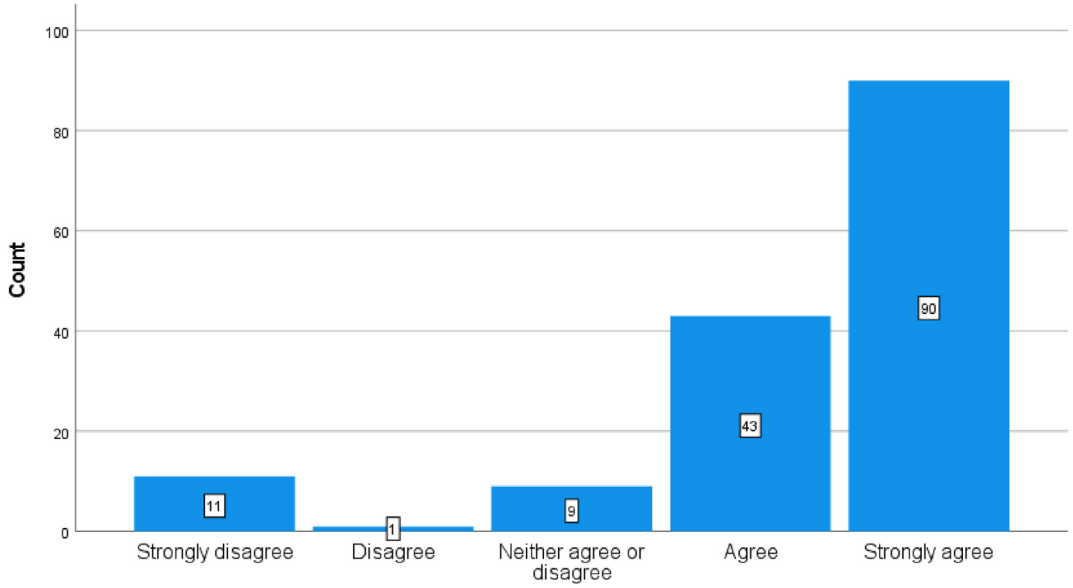

Figure 3. Level of agreement with the statements related to recommending the webinars to colleagues.

already learned" (P109 – PT – TR/RTT); "paradigm of RT has changed since I first trained, it was helpful to draw these concepts together with a radiobiological focus" (P25 – AU – ACA); "They were useful to me (…) I am interested in the novelties in the planning and treatment of cancer patients" (P87 – BG – MP).

Another theme was that the webinars shared experiences from other departments, which the participants would not have access to: "Sharing the experience and practices/organisation from professionals in other departments around the world" (P57 – BG – MP); "Learning from the experiences and way of working of others allows us to improve certain aspects of our professional practice." (P61 – PT – TR/RTT).

Respondents generally agreed or strongly agreed that the webinars motivated them to change their practice (n = 122, 79%) and plan to use the knowledge in their practice (n = 125, 81%). Additionally, many respondents had already applied them into practice at the time of this study (n = 100, 65%), and many already saw change in their departments (n = 104, 68%). There is a decrease

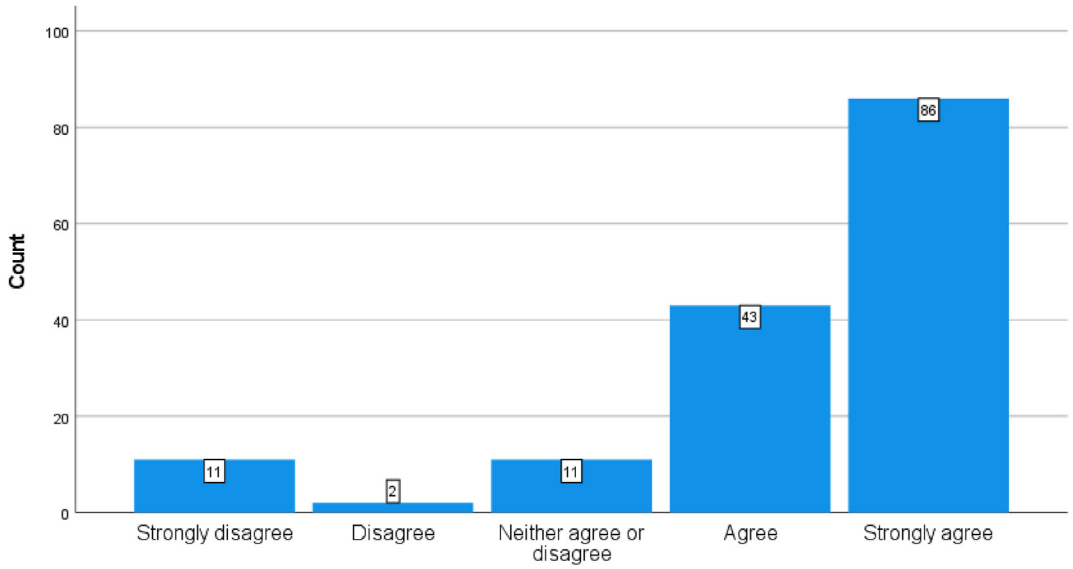

Figure 4. Level of agreement with the statements related to recommending the webinars to students.

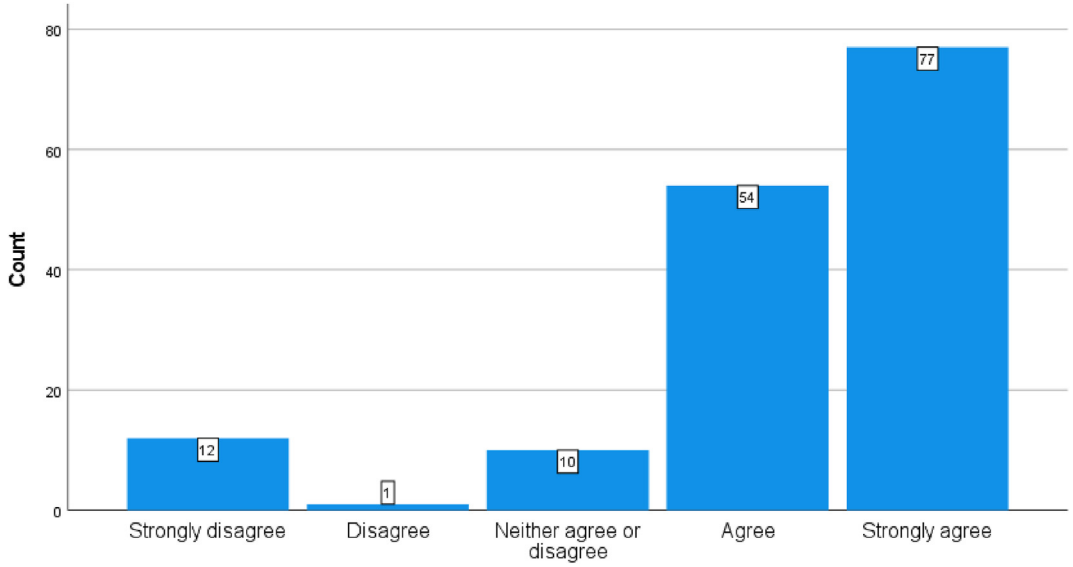

Figure 5. Level of agreement with the statements that the webinars increased the participants' knowledge.

in the level of agreement between the intention to apply knowledge to change practice and if the practice had already been changed (mean score = 4.04 and 3.69 respectively). This difference was found to be statistically significant (X^2 (1) = 38.754 $p < 0.001$). The level of agreement with the statements related to application into practice can be seen in Figs. 7–10.

Importantly, some respondents indicated in the open questions that they plan to apply the new knowledge to their practice: "I can apply concepts in my daily work" (P38 – ES – DR/NM); "I learned new things in radiotherapy" (P78 – DZ – MP).

Some participants who have teaching roles also identified that they plan to apply the knowledge in their teaching: "to share and teach my colleagues and as lecture content" (P31 – MM – MP); "These topics are relevant to my current lecturing and research activities" (P14 – IE – ACA).

Most respondents agreed or strongly agreed that lecturers can use the webinars in their teaching (n = 123, 80%) (Fig. 11) or as on-the-job training and CPD (n = 123, 80%) (Fig. 12). Among those who stated that they perform roles as educators academically or clinically (n = 93), 50 respondents (54%) agreed or strongly agreed that they already used the webinars in their teaching (Fig. 13).

Participants who are students or new graduates reported that these webinars helped to increase their knowledge: "New concepts at my level as a student" (P46 – IE - STU) or "Helpful for medical physicist" (P30 – NP – STU).

Some participants referred to the usefulness of specific webinars and their importance. For example, one participant highlighted the usefulness of "learning from previous incidents" (P39 – NG – DR/NM) when discussing the mini-series episodes about incidents in RT. A participant stated that the webinar about circular economy

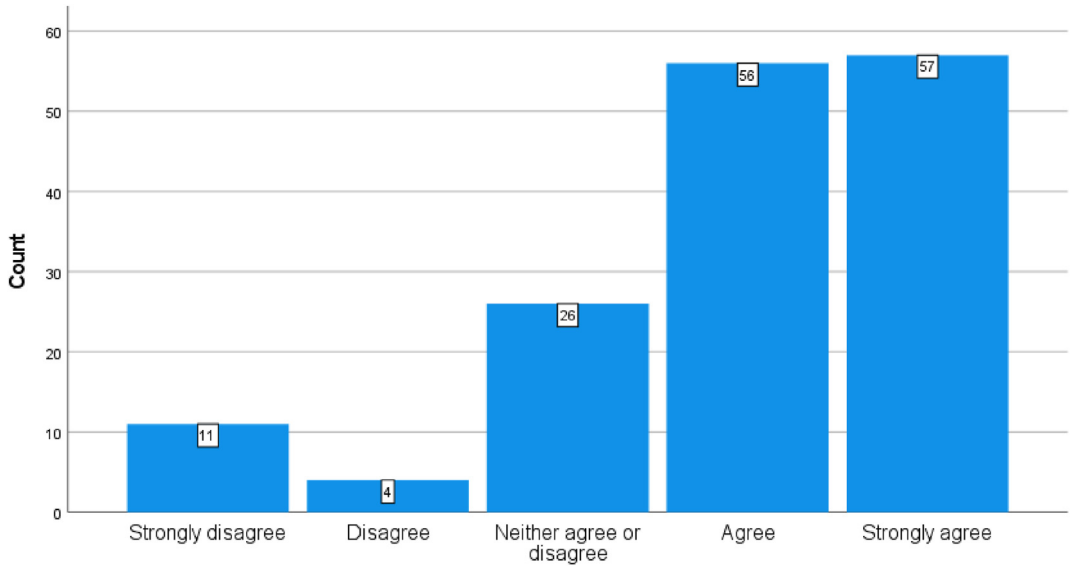

Figure 6. Level of agreement with the statements that the webinars increased the participants' skills.

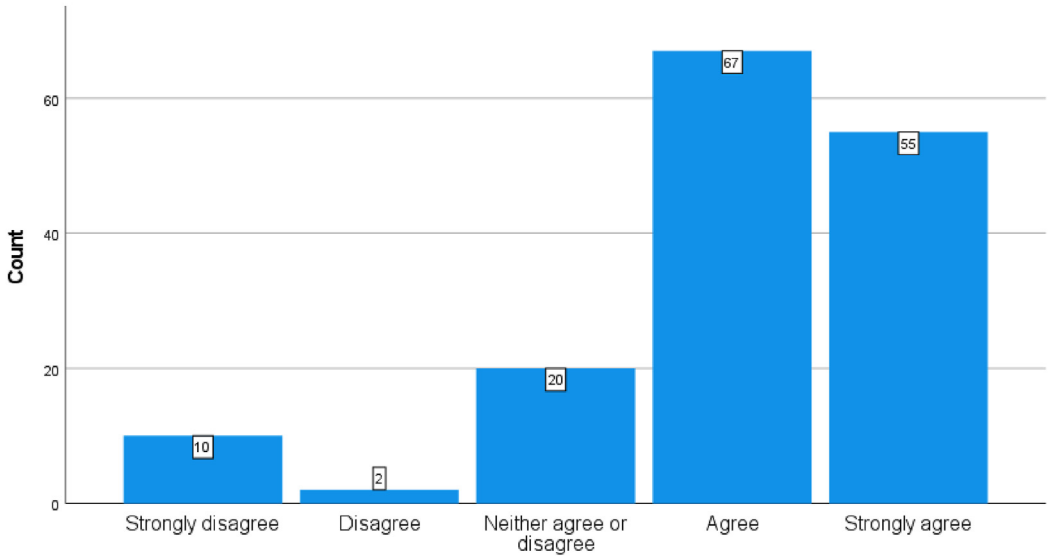

Figure 7. Level of agreement with the statement "the webinars motivated me to change something in my professional practice".

"has [informed] me on how to use eco-friendly materials" (P44 – NG – TR/RTT), however, other participants found this webinar less useful "The webinar, in general, was not related to green skills in the RT profession from my perspective. I thought it was going to have a different orientation to perform green skills from our role in practice." (P27 – CR – TR/RTT). Another participant found the patient-care-related webinars (S2E4 and S3E4) beneficial even though this participant is not a clinician "how we care about patients, who they are and how we treat them" (P67 – HR – ENG).

Some webinars were considered less useful because they covered topics not being practised by the attendees. Relating to S1E1 and S1E2, a participant stated that "While the content of these webinars was excellent, and it was interesting to gain an insight into the role of the RT radiographer in managing RT side effects, the topic does not directly relate to my current teaching role" (P14 – IE – ACA). While another participant mentioned that "I don't deal with protons" (P55 – PH – MP) when stating that the S2E7 webinar was not valuable.

Discussion

There were a total of 11,286 unique registrations across the 18 episodes (mean of 627 per episode, range: 286–1085) with subsequent attendance by 6653 (mean of 370, range: 159–649) (Table 2). Attendance rates were thus between 52 and 70% (mean = 59%). The attendance rates, together with a mean 'average interest rating' of 93% (range: 85–97%), are a marker of success as other webinar series have reported an attendance rate of

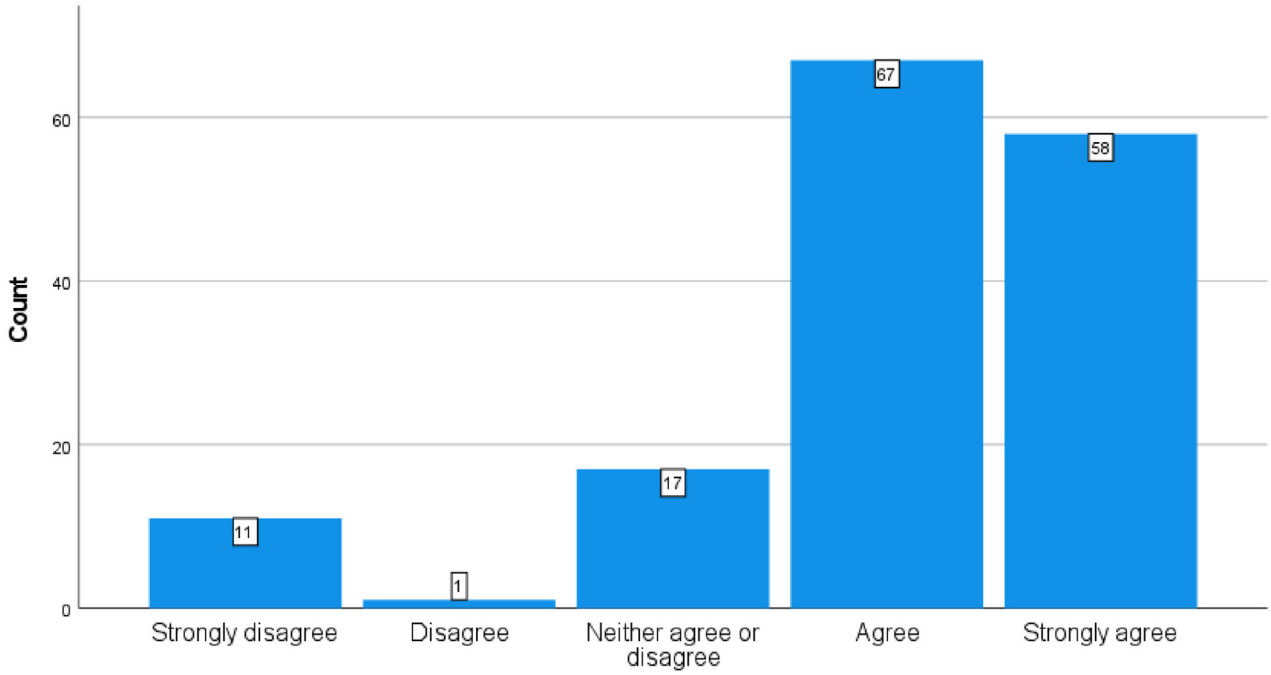

Figure 8. Level of agreement with the statement "I plan to use the knowledge/skills gained in my practice".

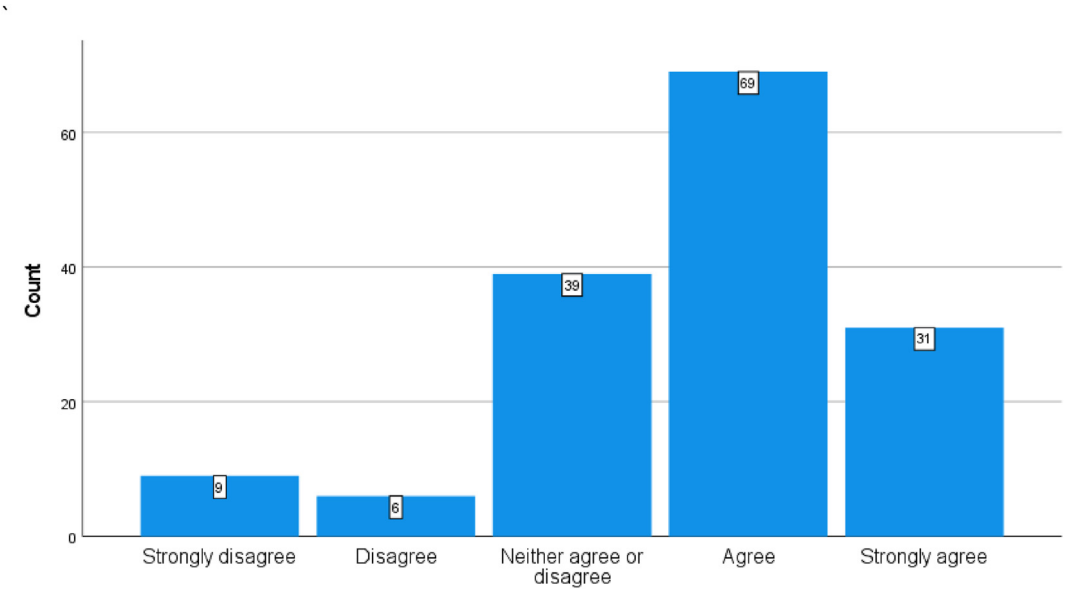

Figure 9. Level of agreement with the statement "I already used the knowledge/skills gained in my practice".

approximately 40%, with just 40% of attendees remaining online for the entire webinar.[28] Some sectors, including healthcare, have been reported slightly higher attendance rates with data from the European Society of Thoracic Surgeons demonstrating average attendance rates of 48% over 5 years of webinar delivery[29]; further demonstrating the excellent engagement with this project's webinars. With the duration of attendance a factor in the GoTo-Webinar average interest ratings, attendees were unlikely to reach a 100 in the scale, so ratings above 80 are good and above 90 are considered very good.[30]

Although the webinars had the European TR/RTT market as the target, participants from all backgrounds were welcome to attend. This is reflected in the distribution of professions and countries replying to this impact study. This attendance shows an overlap of the body of knowledge between the various professions working in RT and emphasises the solid multidisciplinary teamwork required

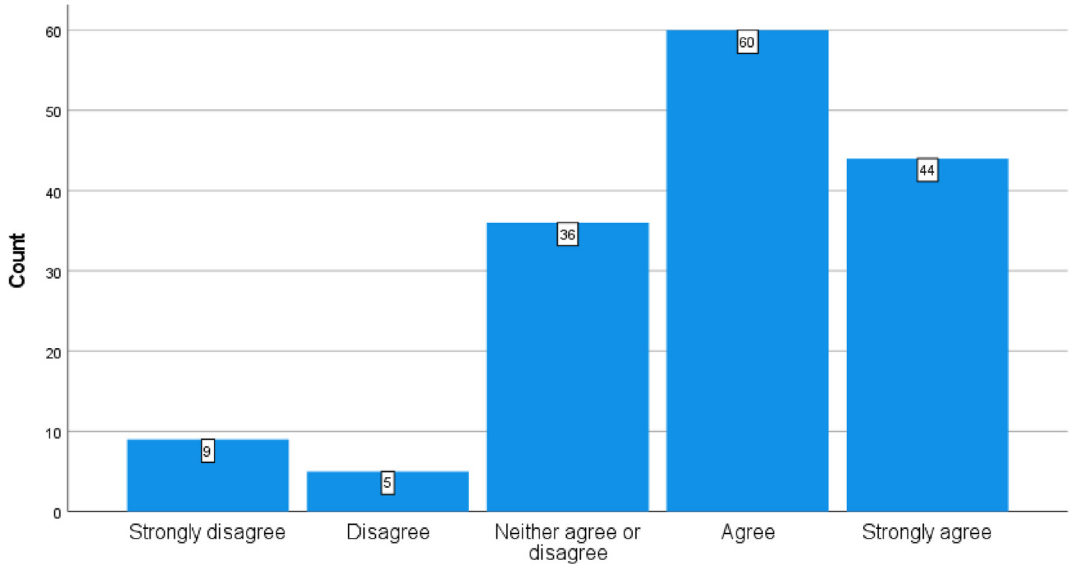

Figure 10. Level of agreement with the statement "the webinars promoted a positive change in practice in my workplace".

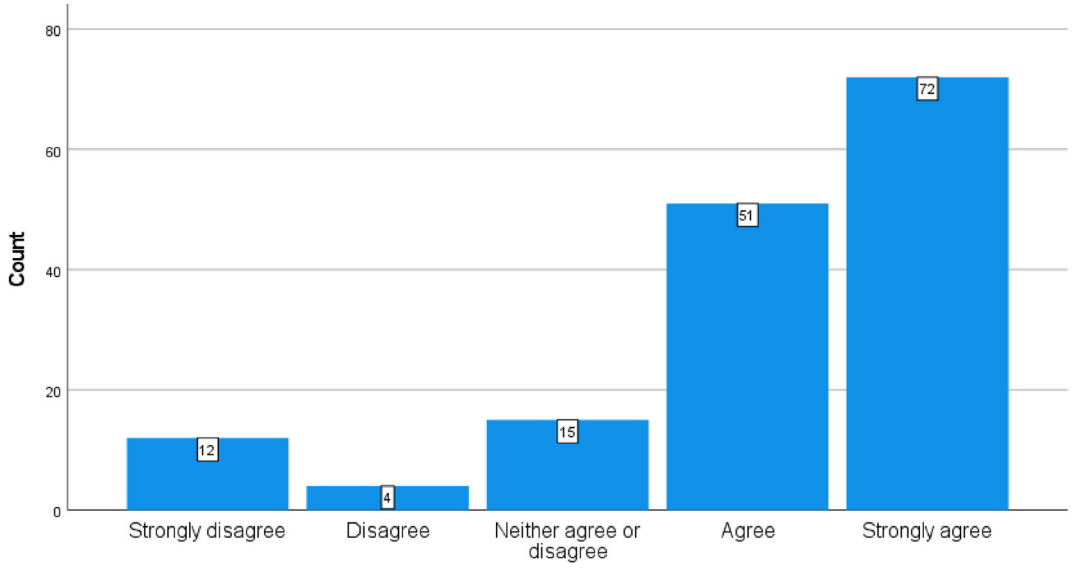

Figure 11. Level of agreement with the statement "these webinars can be used by lecturers in their teaching".

in RT departments. It also confirms that not only European professionals benefit from additional and continuous training, but this need is felt worldwide.[31–33]

The impact survey reached participants worldwide and was a good representation of the webinar attendees. There were 37–64 countries (mean = 53) represented across the 18 episodes, with attendees across the webinars joining from 107 different countries. The impact study reached 56 countries across all continents. Two countries have a considerably high representation (Portugal and Croatia); however, this reflects the webinar attendees due to excellent dissemination by local partners in these countries.

Even though most of the attendees to the webinars were TR/RTTs (43.8% of all attendees), they only represent 23.7% of respondents to the impact questionnaire. Comparing the proportion of professions attending the webinars (Table 3) and the professions of the impact survey respondents (Table 5), it is possible to conclude that, proportionally, radiographers (in RT, MI and NM) engaged less with the impact survey while medical physicists and academics engaged more with it. However, all professions attending the webinars are well represented. Additionally, the study aimed to evaluate impact regardless of the profession, therefore, the differences observed do not compromise the conclusions of this study.

The data showed that webinars were of good quality. This is directly observed in the answers to the open-ended questions, where it is stated that the presentations and presenters were good, but also in close-ended questions about the quality of the webinars. The feedback form showed that participants thought the

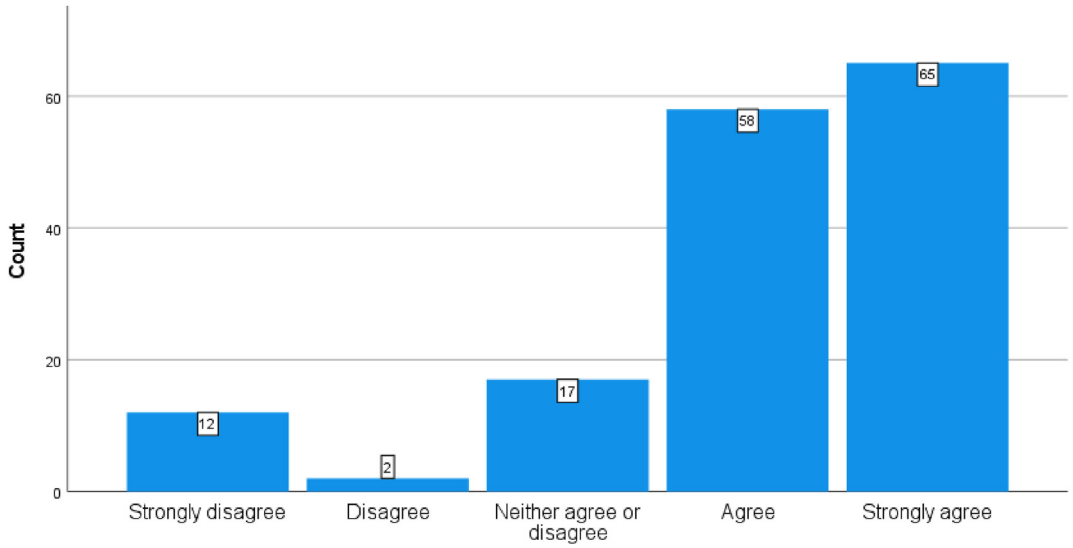

Figure 12. Level of agreement with the statement "these webinars can be used for training of healthcare professionals after graduation (e.g. on-the-job training and CPD").

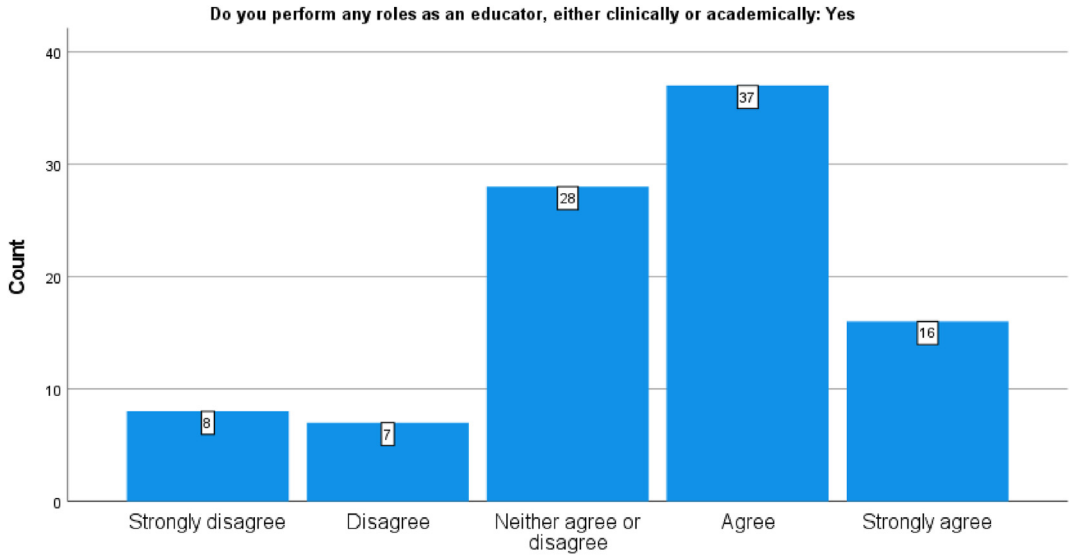

Figure 13. – Level of agreement with the statement "I used these webinars in my teaching".

information delivered was close to what they expected (mean 4.39 rating out of 5), that the subject was delivered effectively (4.40), and that the pace was satisfactory (4.25) (Table 4).

Additionally, most respondents (86% and 84%) recommend these webinars to colleagues and students. In the feedback form, the likelihood of recommending the webinars to a colleague rated 8.96 out of 10 (Table 4). These findings agree with the conclusion of a systematic review that states that staff are generally satisfied with the quality of webinar training activities.[14]

The webinars increased the knowledge and skills of most participants (Table 4, Figs. 5 and 6), and these participants intend to apply this new knowledge into practice (Table 4 and Fig. 8). Some of these participants (65%) had already done so by the time of this impact study (Fig. 9). Therefore, the main aim of improving radiotherapy practice was achieved. Literature has shown that webinars enhance the knowledge and skills of professionals.[13,14] In general, the benefit of webinars are equivalent to that received with in-person training.[14] Other authors have identified that some webinars are perceived to be more beneficial,[12] however the specific elements that improve the webinars' training value require more research.[14]

The increase in knowledge came from new topics covered during the webinars, such as new techniques or concepts not covered in their initial educational programmes. Therefore, webinars are an excellent way to promote professional growth.

In particular, some participants mentioned the importance of sharing experiences from different departments in the open-ended questions. This shows that knowledge and skills tend to be developed locally, and European/worldwide webinars may efficiently disseminate knowledge beyond local departments and country borders.

Some participants stated that the webinars helped revise topics they had learned before (but had forgotten). This knowledge loss phenomenon was studied before,[31] and revising topics covered in

the initial education is essential to maintain knowledge. Once again, webinars are an effective method to achieve this goal.

Most participants (80%) agreed the SAFE EUROPE webinars are valuable teaching tools. The quantitative data was complemented by statements given by students in the open-ended questions. The content and new knowledge provided by the webinars was already implemented by 54% of the participants with teaching roles, showing the significant impact achieved by this project.

The webinars promoted changes in clinical practice. Numerous participants reported that they planned to apply new knowledge into practice in addition to those who had already changed practice at the time of the survey. Therefore, it was clear that the content provided by the webinars positively impacted clinical practice. The open questions showed that participants used the new knowledge to change practice both clinically and in academia.

Webinar usefulness may depend on individuals' areas of interest. Participants commented on how specific webinars were explicitly valuable to them, while others commented that specific webinars were not within their area of practice.

Conclusion

The webinars achieved the aims identified at the beginning of the SAFE EUROPE project: to improve practice (through increasing knowledge and skills) and to be used as teaching tools. As such, the impact of these webinars, which are the end-product of the SAFE EUROPE project, is extensive not only for TR/RTTs in Europe (target audience) but for a range of professionals practising worldwide.

The webinars had an excellent attendance, with 8428 participants (as of August 1st, 2023) from at least 56 different countries across all continents. The webinar recordings will be continue to be available in the EFRS (www.efrs.eu/webinars) and SAFE EUROPE (www.safeeurope.eu) websites, therefore, this number will increase with time. The webinars were considered of good quality and improved the knowledge and skills of participants supporting previous literature about the effectiveness of webinars.

Webinars are a cost-effective training tool that easily reach a broad audience worldwide. However, more research is needed to identify the specific elements of webinars that make some webinars more effective than others.

Conflict of interest statement

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.radi.2024.03.011.

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