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# Technical Innovations & Patient Support in Radiation Oncology

journal homepage: [www.elsevier.com/locate/tipsro](http://www.elsevier.com/locate/tipsro)

Research article

## Radiation therapy technologists' involvement and opinion in research: A national survey in Italy



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### ARTICLE INFO

#### Article history:

Received 30 March 2020

Received in revised form 4 May 2020

Accepted 14 May 2020

#### Keywords:

RTT  
Research  
Education  
Training  
Career  
Italian

### ABSTRACT

**Introduction:** This survey describes Italian RTTs' involvement and opinions in research activities related to radiation oncology. Primary aim was to assess the degree of involvement of the national RTTs community in research and to describe how RTTs can integrate their skills collaborating with other professionals.

**Materials and methods:** A ten-items multiple-choice questionnaire, with 2–8 possible responses, was developed by a steering committee and generated on a survey platform. Links were sent via email to Italian RTTs.

The questions were divided in 3 domains: demographic data; scientific research and activity; opinions about RTTs role in scientific research. The survey started on October 1, 2018 and ended on January 31, 2019.

**Results:** One hundred thirty-five out of 509 (26.5%) RTTs responded to the questionnaire at its expiring date; 97.73% think to be valid contributors in radiation oncology research, expressing clear interest in “data collection” tasks (52.71%); 38.64% feel unsupported by other professionals in the research team and 59.85% of the respondents are not members in any scientific society.

**Conclusions:** The role of Italian RTTs in research is heterogeneous. Mainly RTTs in the age range from 30 to 40 years responded to the survey showing their interest in scientific research. This might be related to different informatics and educational skills as well as to personal attitudes. RTTs particular skills, like data management and technical hypothesis generation abilities, are of benefit to realize research projects. Therefore, engaging RTTs in research activities is strongly suggested.

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### Introduction

Constant developments in medicine and related technologies require increasing involvement of health professionals in research activities to generate scientific evidence, guiding clinical decision-making and enhancing the quality and safety of their clinical practice [1,2].

Modern cancer care implies a multidisciplinary effort involving professionals with different backgrounds and skills; their cooperation in common research activities represents a crucial moment to advance knowledge and to generate evidence-based medicine [3–5].

In this context, radiation oncology (RO) embodies a composite field of knowledge in which all professional figures involved in

patient management contribute to multidisciplinary research efforts [6–8].

The complexity of cancer patients and the rapid changes in terms of technological evolution that characterize RO as a discipline, require that all involved professionals have to remain updated on scientific progress and trained in interdependent skills of their specific professional area [9].

Scientific research in RO has historically relied on two principal professional figures: the radiation oncologist and the medical physicist [10].

The evolution of radiation therapy technologists (RTTs), a specifically trained professional figure in cancer care, receiving continuous training based on updated educational programs, has generated multiple opportunities to integrate their new perspectives and skills in clinical research projects in cooperation with radiation oncologists and medical physicists [3,11,12].

A specific three years bachelor of science degree for RTTs was introduced in Italy in 1996, updating the pre-existing law of

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1938 about university teaching regulation and introducing a specific RTTs core curriculum for the first time.

Unfortunately, little attention was addressed by that law and the immediately following academic regulations to develop specific competences for RTTs in the field of clinical research, creating a stable mismatch between the official core curriculum and the growing amount of skills required from the operators.

Since then, the formative initiative was left, with significant local inhomogeneities, to the single universities through the organization of lessons and seminars for RTTs about research methodology, biostatistics, reference search and scientific writing.

Thanks to the establishment of a permanent national task force for health sciences bachelor degrees, the core curriculum of Italian RTTs has recently become object of revision and discussion, aiming to improve teaching programs and open new career opportunities for the category which can now apply for further specialization degrees and PhDs programs.

Besides these government initiatives, the different RTTs representatives have formed the FASTeR federation (<https://www.associazionefaster.org/>) that unifies Italian RTTs and radiographers with the aim to specifically promote and facilitate technical-scientific research in their field of activity.

Aim of the study was to investigate and describe opinions and involvement of RTTs in radiation oncology research groups in Italy, with the objective to highlight specific professional and research skills in multi-professional teams dealing with research projects.

## Material & Methods

A ten-item closed-ended questionnaire (see Table 1) was *ad hoc* generated on an online survey platform to assess RTTs involvement and degree of interest in multi-professional research teams [13–15].

A steering committee comprising by a junior RTT, a senior RTT with leadership position in the Italian RTTs national association (Associazione Italiana Tecnici di Radioterapia Oncologica e Fisica Sanitaria - AITRO) and a radiation oncologist with specific educational experience, composed the multiple-choice survey. More specifically, responders were asked to express their opinion about RTTs involvement in RO scientific research as well as whether and in which role they already took part in research projects.

The questions were divided in three domains: demographic data; scientific interest and activity; personal opinions about the role of RTTs in scientific research.

Responders had the choice between two to eight options to answer the questions [16].

In cooperation with AITRO the survey was extended to a national level using also their mailing list to diffuse the questionnaire.

The mailing of the survey link started on October 1 2018. A reminder was sent after three weeks, while a last recall was forwarded on January 10 2019, shortly before the survey expiration date. Data collection ended on January 31 2019.

## Results

The survey questionnaire was sent to a total of 509 RTTs, working in all types of healthcare institutions all over Italy, of which 135 (26.5%) responses were received.

### Demographic data

About sex and age range, a predominance of male RTTs (56.82%) answered the questionnaire, with 24.24% in the 30–40 years age

**Table 1**  
Ten-item multiple choice questionnaire.

### Demographic data

1. Report your sex and age range:
  - a. Female, 20–29 years
  - b. Female, 30–40 years
  - c. Female, >40 years
  - d. Male, 20–29 years
  - e. Male, 30–40 years
  - f. Male, >40 years
2. In which kind of institution do you work?
  - a. Hospital
  - b. Research Institution
  - c. University Hospital

### Scientific interest and activity

3. How many times have you contributed to research projects?
  - a. 0
  - b. 1–4
  - c. 5–10
  - d. >10
4. How many scientific papers do you read per year?
  - a. 0
  - b. <10
  - c. 10–20
  - d. >20
5. Are you member of one or more scientific society?
  - a. None
  - b. 1
  - c. 2
  - d. 3
  - e. >3
6. How many scientific conferences do you attend per year?
  - a. None
  - b. 1
  - c. 2
  - d. 3
  - e. >3

### Opinions about the role of RTTs within scientific research

7. Do you think that RTTs represent valid contributors in research projects?
  - a. Yes
  - b. No
8. If your answer is “yes”, how?
  - a. Formulation of research hypotheses
  - b. Literature search and revision
  - c. Data collection
  - d. Data analysis
  - e. Paper writing
  - f. Other
9. In your opinion, which are the principal benefits for RTTs participating in research groups?
  - a. Development of new personal competences and increased knowledge
  - b. Personal reward, urge to be involved, professional satisfaction
  - c. Benefit for patients and the scientific community
  - d. Multidisciplinary cooperation and team building
  - e. Career advancement and leadership development
  - f. Financial compensation
10. In your opinion, what is the principal obstacle for RTTs participating in research projects?
  - a. Excessive workload
  - b. Lack of support from other professional figures (radiation oncologists, physicists, etc.)
  - c. Lack of funding
  - d. Lack of specific training
  - e. Language barriers
  - f. Ethical issues
  - g. Subtraction of time to other personal commitments
  - h. Lack of personal motivation

group, while a slight predominance in the over 40 year's age group (19.70%) was observed for female RTTs.

Regarding the type of institution RTTs are working in, 52.31% of responders answered “university hospitals” or “scientific institutes”, while 47.69% answered they work in “hospitals”.

### *Scientific interest and activity*

Concerning participation in research projects, the majority of RTTs declared a contribution to very few projects per year (43.94% to 1–4 projects/year); 41.67% were never involved in a research project; only a small group of responders participated in more than 5 projects/year (14.39%).

Regarding scientific papers read per year, 6.06% of RTTs declared to read more than 20 scientific papers per year; 63.64% less than 10; 23.48% between 10 to 20 and 6.82% of responders admitted to not read scientific papers at all.

As for membership in other scientific societies, 59.85% of responders declared no membership in any scientific society, 22.73% declared membership in one scientific society; 14.39% in two; 2.27% in three and 0.76% in more than three societies.

Regarding attendance at scientific conferences, 25.95% of responders attended at one scientific conference per year; 20.61% at two; 19.85% at three; 22.90% at more than three, while 10.69% not at all.

### *Opinions about the role of RTTs in the context of scientific research*

Questioning the opinion if RTTs represent valid collaborators in research projects, the large majority of responders (97.73%) answered with “yes” and 2.27% answered with “no”.

As for how RTTs can contribute, the majority (52.71%) responded “data collection”; 17.83% voted for “formulation of research hypotheses”; 12.40% “paper writing”; 7.75% “data analysis”, while 3.88% answered “literature search and revision”. Instead, 5.43% ticked “other” ways of cooperation.

Regarding benefits for RTTs participating in research groups, 67.42% voted for “development of new personal competences and increased knowledge”, 13.64% answered “benefit for patients and the scientific community”, 10.63% replied “personal reward, urge to be involved, professional satisfaction”, 3.79% responded “multidisciplinary cooperation and team building”, 3.03% ticked “career advancement and leadership development” and 1.52% chose “financial compensation” 1.52%.

The principal obstacle, expressed by 38.64% of survey participants, participating in research projects was considered the “lack of support from other professional figures (radiation oncologists, physicists, etc.)”, “excessive workload” in 23.48%, “lack of specific training” in 16.67%, “lack of personal motivation” in 9.85%, “lack of funding” in 6.82%, “subtraction of time to other personal commitments” in 3.79%, “language barriers” in 0.76%, while “ethical issues” was not considered an obstacle at all.

## **Discussion**

To our knowledge, this study represents the first attempt to survey the role and participation of Italian RTTs in scientific clinical research.

The response rate obtained (26.5%) discloses a limited interest of this professional group towards research perspectives. More specifically, demographic data suggest that male RTTs older than 30 years represent the predominant group in sharing research experiences, reflecting the age and gender predominance of the Italian RTT community, as 51% (84/164) of AITRO members are male between 30 and 45 years old.

These data allowed identifying the working areas of RTTs involved in the survey, to hypothetically link institutions with professional involvement in scientific activity.

In order to simplify data interpretation, the two categories “University Hospitals” and “Research Institutions” were considered as a single one, leading to a total of 52.31% in comparison to the smaller percentage of RTTs working in Hospitals (47.69%).

To evaluate the interest of RTTs in research, we evaluated the number of scientific articles consulted over the last year for research, professional updating or merely for personal information. 63.64% of the answers turned out “less than 10”, despite more than half of the responders (52.31%) was working in institutions granting institutional access to scientific journals and library resources (i.e. Universities and Research institutions). As a result, no uniform interest in updating, reflecting on research carried out by colleagues or other professionals, exists in our cohort of RTTs.

Relevant information concern the attitude to be enrolled in one or more scientific societies; the answers gave useful insights on the willingness and availability of RTTs to participate in professional events; 65.85% have currently no membership in any scientific society; 16.39% are enrolled in one scientific society, while 11.48% are enrolled in two societies. Option “3” and “more than 3 societies” were selected by two single professionals, respectively, which are to enhance their formative profile.

Congresses participation to gain a professional update is a very important topic that every RTT is warmly invited to consider. Congresses are important opportunities to build professional networks and to share working experiences, as well as to gain new knowledge. The advancement of professional expertise is also encouraged by links established not only between RTTs, but also with other professional figures, who take part in organized training events.

Only few RTTs do not participate on yearly scientific events.

Participation and collaboration in research projects, such as drafting of protocols or scientific publications, is a crucial aspect of this analysis. However, close contacts between RTTs and other figures involved in research projects are extremely limited. Only a small group of RTTs (11.48%) contributed on more than 5 research projects, with the majority of RTTs (88.54%) contributing to very few research projects.

It was also asked if collaboration by RTTs is after all needed and achievable to realize a research project in radiation oncology: 96.72% responders answered that RTTs can be easily integrated into the multi-professional team involved in research. Only 2.27% responded that they consider RTTs as no valid contributors in scientific research.

Questions were subsequently asked in order to evaluate how the RTTs can assist the other professionals in practicing scientific research; the answers highlighted a clear predominance towards “data collection” (45.76%). We hypothesize that most RTTs see their contribution within a research team to competently select and preserve raw data in a transparent way.

About 15% percent of respondents answered that RTTs could contribute in drafting scientific articles or research protocols. The same percentage, the possibility of formulating research hypotheses (15.25%). The analysis of collected data (10.17%) and the review of literature (3.39%), occupy marginal positions, probably also due to difficulties with the lack of adequate statistical and methodological knowledge.

The final questions included possible benefits deriving from research work and latent obstacles, which may prevent RTTs from actively participating in research activities.

Responders were required to explain the most important benefit derived by constant participation of the RTTs in research groups; this is an important point, in order to gain a better comprehension of the real expectations of the technicians themselves. The highest

percentage of responses was related to developing new skills and increasing personal knowledge (63.93%).

Doing research work is therefore interpreted not only as an opportunity to innovate the profession but also as a great occasion of personal growth.

The 16.39% of consulted RTTs believe that the regular participation to research programs can increase the benefits for the whole community, patients and health professionals as well.

The main obstacle between the RTTs and their direct involvement in research work in a radiotherapy context, is actually the inadequate interest of professionals in scientific research.

32.26% of RTTs believe that excessive workloads during service hours prevent them from devoting time to research as it is really difficult to move away from treatment rooms, or to concentrating on different issues.

Leaving aside logistic problems related to daily practice, a conspicuous percentage of technicians has instead shown a lack of support from the other figures involved in the research team (the physician and the physicist in the specific case), probably both in terms of “education to research”, as well as of specific involvement.

The option “Lack of specific training” also occupies a significant position in this survey (19.35%); we think that more efficient research training courses would be necessary, to teach the different aspects of research methodology, how to collect and interpret data, and how to analyzed the obtained results.

Similar percentages were achieved by the options “Lack of motivation” (12.90%) and “Lack of funding for research” (8.06%), while the options “Language barriers” and “Ethical requirements” were not considered as real obstacles.

## Conclusion

The constant technological evolution and growing importance of personalized medicine increases opportunities in radiotherapy research, opening new horizons of clinical approaches for patient's therapeutic pathways. Most of the responders were between 30 and 40 years old, which likely implies that new professionals have different informatics and linguistic skills respect to their older colleagues, which might be related to different teaching programs and personal attitudes.

Participation in educational events and the consultation of scientific articles contributes to improve skills needed to interact with other professionals involved in research projects, an aspect which remains desirable for RTTs.

Our results suggest that RTTs feel most comfortable if involved with data collection and management of research projects, as their daily work consists in evaluating parameters related to radiation therapy.

Our study also reveals how RTTs can be integrated into research projects through data collection and storage, as they are actively involved in the evaluation of core values related to radiation therapy and the clinical behavior of the patient actively involved RTTs in various phases of research projects by the other professional figures, such as physicians; even if they are perceived, by more than 25% of responders, as “not always available”. It can be hypothesized that the lack of trust towards other professionals involved in multidisciplinary research may derive from a shortage of appropriate interest as well as from insufficient training.

However, RTTs specific skills are of added value to realize research projects and we recommend to introduce proactive RTTs

in multidisciplinary research teams, starting from data and imaging collection tasks and involving them in protocol drafting.

We encourage therefore the Radiation Oncology stakeholders to invest in RTTs specific education to research, organizing specific courses about methodology and supporting them in attending international courses and events.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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