

RTT advanced practice and how it can change the future of radiotherapy

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RTT advanced practice and how it can change the future of radiotherapy

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Abstract:	<p>The radiation therapy (RT) landscape is continuously evolving, necessitating adaptation in roles and responsibilities of radiation therapists (RTTs). Advanced Practice Radiation Therapists (APRTs) have taken on a proactive role in expanding services and assuming responsibilities within multi-professional teams.</p> <p>A European Society for Radiotherapy and Oncology (ESTRO) brought geographically diverse and experienced RTTs together, to discuss how advanced practice (AP) in the RTT profession should be future-proofed and create a global platform for collaboration. Challenges in achieving consensus and standardisation of APRT was identified across jurisdictions, emphasising the importance of international collaboration.</p> <p>Whilst highlighting the pivotal role of APRTs in driving innovation, improving patient care, and navigating the complexities of modern RT practice, this position paper presents outcomes and recommendations from the workshop. Discussions highlighted the need for standardised role definitions, education frameworks, regulatory support, and career development pathways to enable the advancement of APRT effectively. Increasing networks and collaboration is recommended to ensure APRTs can shape the future of RT.</p>

Title

RTT advanced practice and how it can change the future of radiotherapy

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Highlights

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- Integration of Advanced Practice Radiation Therapists (APRTs) within the multi-professional team enhances service delivery in radiation therapy (RT).
- APRT goes beyond task shifting, using unique skills and innovation to enhance patient care.
- Future APRT roles should be based on the level of practice, not the technology or an individual.
- There is a need for standardisation of APRT through consensus, including education frameworks, levels of practice and career progression.
- Challenges may be overcome through international collaboration and practice sharing across jurisdictions.

Term	Definition	Author Contribution
Conceptualisation	Ideas; formulation or evolution of overarching research goals and aims	Aileen Duffton, Yatman Tsang, Helen McNair, Nicole Harnett
Methodology	Development or design of methodology; creation of models	Aileen Duffton, Yatman Tsang, Helen McNair, Nicole Harnett
Validation	Verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs	Aileen Duffton, Yat Tsang, Nicole Harnett, Helen A McNair, Erica Bennett, Melanie Clarkson, Jose Guilherme Couto, Gavin Lawler, Kristie Matthews, Celeste Oliveira, Natalie Rozanec, Rita Simões
Formal analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data	Aileen Duffton, Yat Tsang, Celeste Oliveira, Gavin Lawler
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection	Aileen Duffton, Yat Tsang
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools	Aileen Duffton, Yat Tsang
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse	Aileen Duffton, Yat Tsang
Writing - Original Draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation)	Aileen Duffton, Yat Tsang
Writing - Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre-or postpublication stages	Aileen Duffton, Yat Tsang, Nicole Harnett, Helen A McNair, Erica Bennett, Melanie Clarkson, Jose Guilherme Couto, Gavin Lawler, Kristie Matthews, Celeste Oliveira, Natalie Rozanec, Rita Simões
Visualisation	Preparation, creation and/or presentation of the published work, specifically visualization/ data presentation	Aileen Duffton, Yat Tsang, Nicole Harnett, Helen A McNair, Erica Bennett, Melanie Clarkson, Jose Guilherme Couto, Gavin Lawler, Kristie Matthews, Celeste Oliveira, Natalie Rozanec, Rita Simões
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team	Aileen Duffton, Yatman Tsang
Project administration	Management and coordination responsibility for the research activity planning and execution	Aileen Duffton, Yatman Tsang, Celine De Champs
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Abstract

The radiation therapy (RT) landscape is continuously evolving, necessitating adaptation in roles and responsibilities of radiation therapists (RTTs). Advanced Practice Radiation Therapists (APRTs) have taken on a proactive role in expanding services and assuming responsibilities within multi-professional teams.

A European Society for Radiotherapy and Oncology (ESTRO) brought geographically diverse and experienced RTTs together, to discuss how advanced practice (AP) in the RTT profession should be future-proofed and create a global platform for collaboration. Challenges in achieving consensus and standardisation of APRT was identified across jurisdictions, emphasising the importance of international collaboration.

Whilst highlighting the pivotal role of APRTs in driving innovation, improving patient care, and navigating the complexities of modern RT practice, this position paper presents outcomes and recommendations from the workshop. Discussions highlighted the need for standardised role definitions, education frameworks, regulatory support, and career development pathways to enable the advancement of APRT effectively. Increasing networks and collaboration is recommended to ensure APRTs can shape the future of RT.

Background

Radiation Therapy (RT) is rapidly evolving and has become increasingly complex. Integration of novel techniques and advanced technology into clinical practice requires healthcare professionals to adapt their roles and responsibilities [1]. In the past decade, roles within RT have evolved from a clinician-led model to a multi-professional team (MPT) approach [2,3].

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4 The Advanced Practice Radiation Therapist (APRT) is an autonomous professional within the MPT
5 who acts beyond the traditionally defined radiation therapist (RTT) scope of practice (SOP) [4-7].
6 APRTs work safely within an advanced, extended, but defined SOP, routinely involved in all
7 aspects of the pathway. APRT actively develop services and adopt tasks traditionally fulfilled by
8 other members of the oncology MPT. This task-shifting approach has been conceptualised under
9 the implementation of APRT to meet service demands, addressing perceived or known gaps in
10 the RT pathway [2].
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21 In 2019, the European Society for Radiotherapy and Oncology (ESTRO) Radiation Therapist
22 committee (RTTC) presented an overview of the evidence for APRT and delivered the ESTRO RTTC
23 position on the future of advanced practice (AP) for the RTT profession [4]. Although similar APRT
24 roles can be identified, many APRT positions are unique and developed in response to a specific
25 service need [8,9]. The visibility of the overt and hidden impacts of these roles should be
26 promoted and showcased, to drive RT service delivery [2-4,7-9], ensuring stakeholder support
27 which is essential for sustainability.
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38 As a professional group, it is essential for APRTs to be equipped with critical thinking skills [5],
39 allowing the adaption of APRT roles in response to ongoing changes in the scientific landscape,
40 technology, and service needs. Task shifting through APRT roles is not the replacement of medical
41 colleagues alone. Rather it maximises the potential for the APRT to use their specialised training
42 and expertise, enhancing efficiency and effectiveness in performing tasks. For the profession, it
43 presents opportunities for career development, professional progression, and recruitment and
44 retention, especially when there is thoughtful and deliberate adoption of the APRT framework,
45 in conjunction with intentionality [2,10,11].
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57 Against this background, a need to bring together RTTs working across a wide spectrum of
58 practice and geographical variance were identified to discuss how the RTT profession should be
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future-proofed and create a global platform for collaboration. This resulted in the ESTRO 2022 RTT workshops entitled, “RTT advanced practice and how it can change the future of radiotherapy”. This paper aims to present outcomes from these workshops. The objective was to establish recommendations and investigate potential enablers to facilitate APRT progression.

Workshop process & Participant selection

ESTRO 2022 RTT workshops were designed to facilitate scientific collaborations and professional networking within the RTT community. Workshops were advertised on the ESTRO webpage and promoted on social media, inviting applications accompanied by a motivational statement. The workshop co-chairs (AD, HMcN, NH and YT) selected participants to form an APRT expert reference group (ERG), based on their motivational statements and the below RTT selection criteria:

- Managers, APRTs and educators
- Highly motivated to define the future of the RTT profession and underpinning education programmes.
- Interested in:
 - extending the RTT scope of practice
 - developing leadership, management, teaching and research skills
 - an education and training framework for APRT
- Greater than three years clinical experience was recommended.

The ESTRO 2022 RTT workshops were composed of two 2-hour virtual meetings held in November 2022 and February 2023 (Figure 1). Prior to the launch of workshops, the APRT ERG members were provided with useful resources on APRT and asked to consider some questions and topics listed in table 1.

Table 1. Questions and statements asked of participants in preparation for the workshop

Questions & statements
a) Prepare 3-4 words to describe APRT.
b) In your opinion, should APRT be interpreted as the scope of practice of an individual or a level of practice?
c) In your experience, is it clear that AP is usually defined by role or technology?
d) Ideally, should APRT role development be driven by technology?
e) Post a question you have on unsolved APRT issues.
f) Insert 3-4 examples of future developments that AP roles are key to their success.

Workshop part 1 (W1)

Attendees were APRT ERG members, with co-chairs acting as facilitators. It commenced with APRT ERG members responding to questions on an online polling platform (Table 1). Responses were anonymous, real-time and could be viewed by all APRT ERG members. This initiated live discussion and using the chat function. The APRT ERG was then split into 2 smaller subgroups to promote further in-depth discussion and collaboration with co-chairs.

After W1, a recording of the meeting and the chat discussion were accessed by individual co-chairs. Following familiarisation with the data, common, repetitive themes were extracted firstly by an individual approach, then agreed using a team consensus (Table 2).

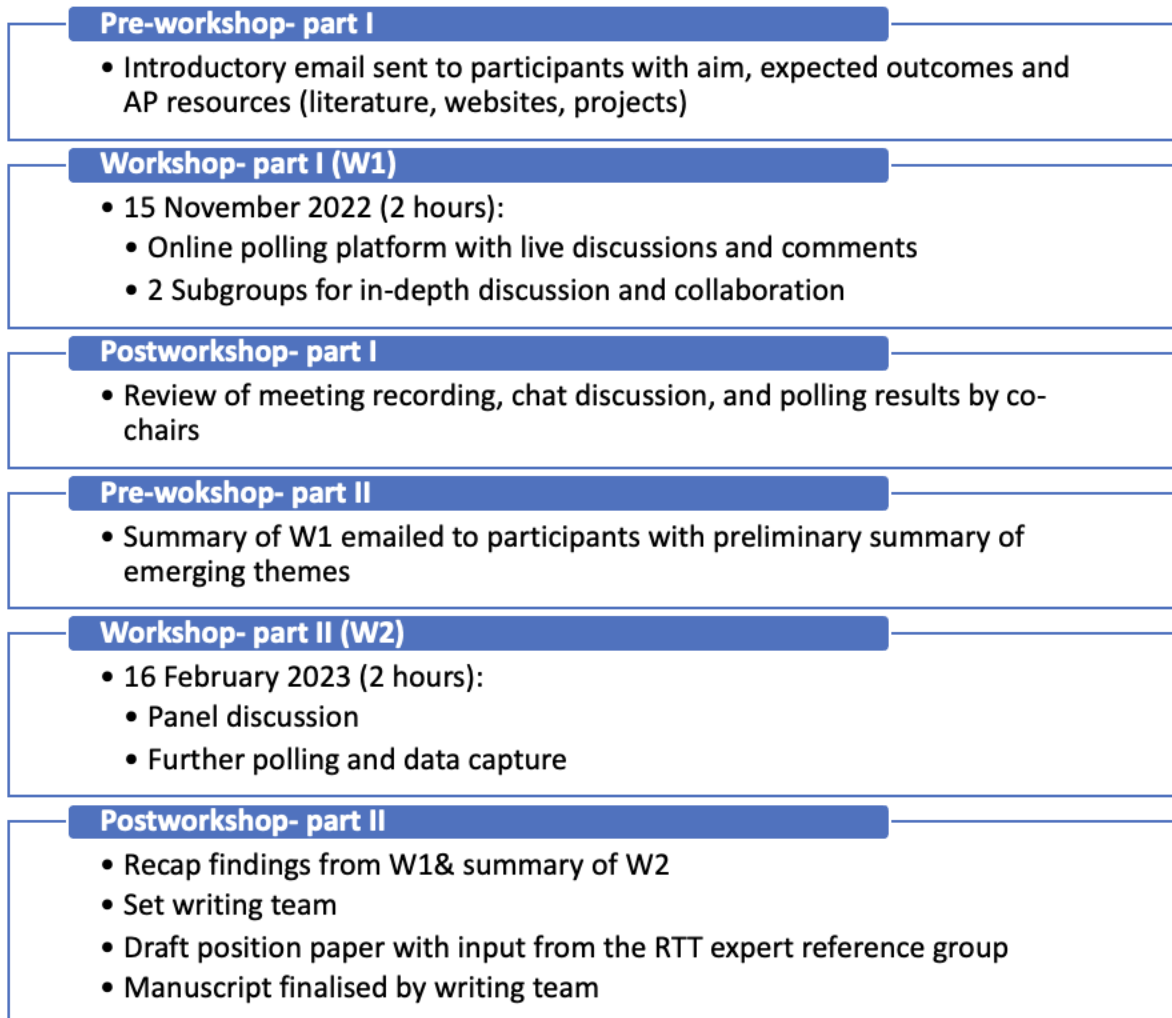
To ensure consistency and coherence, all APRT ERG members were contacted, detailing a summary of W1, and themes. This allowed opportunity for discussion, revisions and refinement before virtual workshop part 2 (W2), reducing unconscious bias of the co-chairs.

In W2, common themes identified from W1 were presented to the APRT ERG. A panel discussion among was conducted regarding potential enablers for driving forward APRT that go beyond pre-defined roles. The APRT ERG used workshop outcomes in the development of this paper, with a draft manuscript written and co-authored by the co-chairs and APRT ERG members who

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expressed interest in joining the writing group. This resulted in a fully collaborative approach, approved by all authors.

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4 **Figure 1. Description of planned workshops**
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49 **Workshop outcomes**

50 Nineteen RTTs submitted applications, of which 17 were selected to participate based on meeting
51 the defined criteria. The APRT ERG was composed of 21 RTTs from the United Kingdom (6),
52 Canada (4), Australia (3), Ireland (2), the Netherlands (2), Switzerland (2), Portugal (1) and Malta
53 (1).
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4 **Workshop part 1 (W1)**
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7 **Clarification of APRT**
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10 Themes and keywords summarised by the co-chairs are described in table 2. Answers
11 emphasised 4 key themes: clinical expertise, decision-making, leadership, and innovation.
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14 **Table 2. Thematic framework regarding the description of APRT**
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Themes	Keywords	Supporting Quotes
Clinical Expertise	<ul style="list-style-type: none">- Autonomy- Specialisation- Competence	<p>“Need to not focus on specific areas, but look at levels of autonomy and levels of working across all 4 pillars”</p> <p>“we need to describe the current AP roles in terms of transversal capabilities & specific competencies to work across all pillars of AP”</p>
Decision-Making	<ul style="list-style-type: none">- Critical Thinking- Complex Decision-Making- Problem-Solver	<p>"Other than AI, ART and automation, what else will shape the future of RT for the RTT. Answer: Clinical Decision Making "</p> <p>“APRT you must do original work - new ways of working, new ways of thinking”</p>
Leadership	<ul style="list-style-type: none">- Influence- Innovative Leadership	<p>“Assisting other setups of AP roles”</p>

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	<ul style="list-style-type: none"> - Agent of Positive Change 	<p>“Ensure adhere to 4 pillars including research and leadership as key components”</p>
<p>Innovation</p>	<ul style="list-style-type: none"> - Resourceful - Multi-disciplinary - Proactive and continuous 	<p>“Research, development and education should be built into APRT role”</p> <p>“Through the practice of the 4 pillars of AP. Research will create new knowledge”</p> <p>Collaborative initiatives with own profession, and other professionals”</p>

Of 17 respondents, 11 indicated that in their experience APRT roles had been developed according to level of practice, and not determined by any individual RTT scope of practice or tasks. They agreed this should be recommended for future APRT roles, expressing strong agreement that by formalising the role itself (and levels), would ensure improved sustainability. 20/21 (95%) participants suggested that APRT role development should not be driven by a particular technology but related to the increased levels of responsibility and autonomy that extends their SOP.

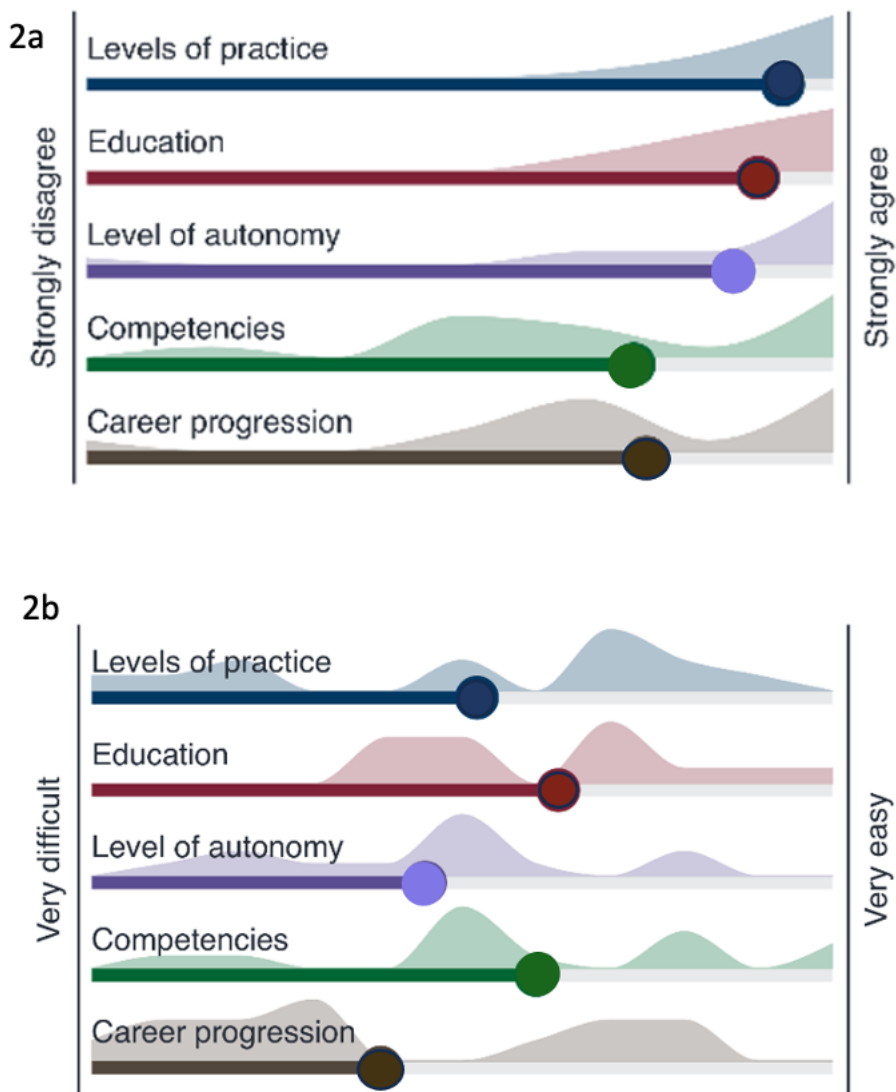
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Standardisation of APRT

Participants level of agreement (on a scale from 1 (strongly disagree) to 7 (strongly agree) of which aspects of APRT need to be standardised, and which ones may be difficult to standardised are demonstrated in figures 2a and 2b. Issues related to standardising APRT, are described in table 3.

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Figure 2a-b. Average agreement on what aspects need to be standardised (a), and level of how easy/difficult to standardise (b). Shading represents variation in answers.



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Table 3. Thematic framework concerning the standardisation of APRT

Themes	Issues	Relevance
Role Definitions	<p>How to standardise APRT roles?</p> <p>How to define advanced practice tasks?</p> <p>How to concretely define APRT competencies?</p> <p>How to differentiate enhanced practice from advanced practice?</p> <p>What counts as advanced practice?</p>	<p>Establishing clear and well-defined roles for APRT is a recurring theme. This clarity is seen as a crucial step in advancing the profession and ensuring that APRT roles are understood and recognized.</p>
Training and Education	<p>What is the most effective framework for training and establishing APRT roles?</p> <p>How to determine effective training frameworks for establishing and growing APRT roles?</p> <p>How to determine the optimal blend of clinical and academic components in APRT training?</p>	<p>The importance of addressing issues related to training and education is emphasised. These include standardising education requirements, recognising different levels of APRT, demonstrating ways to develop these roles, and providing guidance to employers and colleagues.</p>
Regulatory and Funding Challenges	<p>How to overcome regulatory barriers that hinder APRT?</p> <p>How to get buy-in from multi-professional team and management teams to support and develop APRT roles?</p>	<p>This theme displays the identification of solutions to barriers and the exploration of future roles within APRT. This involves considering the needs</p>

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	How to secure funding for specific APRT roles and national practice agreements?	and aspirations of various stakeholders.
Succession and Career Development	How to address the importance of APRT succession planning? How to address career development beyond APRT?	It highlights the need to address APRT career progression within a standardised framework. Research should be significantly embedded in APRT roles, with a focus on its integration, dissemination, collaboration, and impact on patient care and service improvement.

W2 - Enablers for driving forward APRT

Role Definitions

Challenges in defining and understanding APRT were consolidated, including the lack of consensus on the APRT definition, the need for clarity in levels of practice, and the importance of advocacy and education to clarify its meaning and value within the profession. Particular emphasis was on the importance of having a consistent understanding of APRT and achieving some level of consensus within the RT community. It was proposed that developing consensus guidelines and establishing defined pillars of APRT e.g. a “European APRT framework” detailing progression pathways would be advantageous.

Training and Education

The ERG agreed that APRT have a crucial role in adding to the body of knowledge, with suggestions that research is built into APRT roles, focussing on patient care, experience, and the impact of roles. Innovation (“original ideas”), providing education (“sharing work and knowledge”, “presentation and publication”) and collaboration (“building online communities”,

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4 “initiatives with our own profession and other MDT colleagues”) were cited as essential in
5 ensuring APRT roles advance.
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8 9 **Regulatory and Funding Challenges**

10 The APRT ERG recommended there was a need for careful planning, adequate funding,
11 governance, and support to integrate and sustain APRT roles effectively. Proactive planning,
12 recognition, and evidence-based practices were identified to ensure the long-term success of
13 these APRT roles with measurable impact. This theme incorporates various elements, including
14 financial support and the professional integration, both crucial for advancing AP. These are
15 intrinsically linked to the needs and aspirations of various stakeholders.
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25 **Succession and Career Development**

26 Suggestions for succession planning of the APRT role referenced the necessity of the wider
27 organisational support (“government and executive recognition”), “workforce planning”, and
28 recommending integration of APRT into service-design as prospective opposed to “reactive”, i.e.
29 “future-proofing” needs to be strategically embedded into service plans with clear expectations,
30 be evidence-based, and have appropriate governance. There was group agreement that
31 development of AP roles could improve retention.
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40 Other than artificial intelligence or advanced radiotherapy, research and clinical trials;
41 individualised and combined cancer treatment (“precision medicine in RT value-based
42 healthcare”); and patient care (“survivorship”, “prehabilitation and late effects”) were suggested
43 as potential APRT developments. On further discussion, the ERG recognised that the future of
44 APRT should progress with a multifaceted picture of cancer care, defining research as an essential
45 component. Future developments should optimise potential impact on patient-centred
46 approaches, survivorship, multimodal treatments, precision medicine, community-based care,
47 equity, whilst considering the evolving landscape of cancer treatment.
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4 **Discussion**
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7 This paper aligns with the ESTRO RTTC position paper, advocating for APRT adoption and
8 acknowledging its positive impact on patient care throughout Europe [4]. Despite two decades
9 or more of implementation (in some jurisdictions), workshops revealed ongoing variation in
10 definitions and expectations, with no global consensus [2,7]. This reflects the complexity of AP,
11 which has been well described within nursing as “dynamic, complex, and situational”, with
12 international efforts to enhance the understanding of AP roles ongoing [12]. Workshops
13 outcomes, whilst highlighting challenges, can act as an incentive for the RTT profession to
14 advance APRT. To aid this effort, recommendations are summarised in table 4.
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24 **Table 4. Summary of recommendations from workshop outcomes**
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Role Definitions:
<ul style="list-style-type: none">• Establish consensus on APRT definitions and practice levels.• Advocate for clarity and value of APRT within the profession.• Develop standardised guidelines and frameworks for APRT.
Training and Education:
<ul style="list-style-type: none">• Integrate research into APRT roles, focusing on patient care.• Promote innovation, education, and collaboration in advancing APRT.
Regulatory and Funding Challenges:
<ul style="list-style-type: none">• Ensure adequate funding, governance, and support for APRT integration.• Advocate for proactive planning and evidence-based practices.
Succession and Career Development:
<ul style="list-style-type: none">• Support wider organisational recognition and workforce planning for APRT.• Integrate APRT into service design and establish clear expectations.• Emphasise research, precision medicine, and patient care in APRT development.

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54 Contradictions in many jurisdictions stem from a lack of conceptual understanding of the APRT
55 role, often leading to its adoption based on operational demand, rather than from a strategic
56 priority. While APRTs frequently fulfil workforce deficits in a clinical area of practice, they also
57 contribute additional skills at an advanced level of practice. APRTs bring new ways of thinking
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4 and innovative approaches to service delivery across clinical practice, education, leadership, and
5 research [13]. However, challenges arise due to healthcare funding being attached to clinical
6 provision, presenting regulatory challenges when expanding responsibilities beyond initial
7 registration, impacting implementation.
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13 Personalised RT is becoming the standard of care, with a progressive shift away from generalised
14 protocols. RTTs evaluate the clinical and technical aspects of patient care prior to and during RT,
15 making informed decisions on appropriate courses of action [5,14,15]. They play an irreplaceable
16 role in the MPT, and comprehensive education and training must underpin their development,
17 allowing delivery of safe, high-quality care [13]. APRTs rely on complex critical thinking and
18 autonomous decision-making, essential in providing timely and accurate treatment delivery e.g.
19 in stereotactic body RT and adaptive RT, where patient specific adaptations may be time sensitive
20 [16].
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30 The workshop determined that APRT development should focus on levels of responsibility, rather
31 than specific technology, or individuals. APRT utilise expert knowledge, including academic
32 education, clinical experience, and leadership skills, to lead the MPT [17]. They can lead research
33 and quality initiatives, enabling broader professional insights and facilitate practice change [6],
34 moving from a 'task shifting' mindset to one based on a 'level of practice' [9]. While England, has
35 already incorporated this approach into advanced clinical practice framework [18], other
36 countries across Europe are still in their infancy of formalising similar frameworks [8].
37 Contradictions in role expectation and lack of clarity of the role indicate that further guidance is
38 necessary.
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48 In addition to defining roles clearly, the APRT ERG considered standardised expectations in
49 relation to education, career pathways, regulation and funding were important for the
50 development of APRT. Although challenging to achieve, it is important to recognise the
51 significance of standardisation for ensuring transparency of expectations and future growth [2,3].
52 Previous discussions have outlined educational expectations for AP [19] (Coffey and Leech, 2018).
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4 It was recognised that APRT is a higher level of practice demanding expert knowledge and
5 experience, but the level of education required to achieve the APRT title was not clearly defined
6 internationally [19]. As a consequence, implementation is often standalone rather than with a
7 universal approach, creating difficulty in envisioning standardised roles.
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13 Global funding and regulation is challenging due to cultural and economic diversity. Through
14 international innovation and collaboration, impactful research provides the evidence base for
15 APRT role requirements [20,21]. Culture change within a service necessitates evidence
16 showcasing the benefit of APRTs. However, APRTs need enabled to undertake research, and as
17 discussed, this should be part of the APRT role, supported by job plans. Research is often the
18 weakest aspect due to lack of skills and confidence; therefore, entities such as the collaborative
19 Advanced Practice Radiation Therapy International Community of Practice (APRT ICoP) group are
20 important enablers. Currently, the APRT ICoP has more than 70 members from 17 different
21 countries. Working with stakeholders to affirm and promote APRT role identity, it aims to
22 influence increasing APRT utilisation in cancer care systems; and provides an accessible
23 mechanism for APRTs to share knowledge and provide mentorship. Collaborative groups allow a
24 supportive environment for research development, allowing co-design and co-elevation of ideas,
25 bringing them to fruition and motivating APRTs to undertake and disseminate impactful research.
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42 **Conclusions**

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45 Fundamentally, implementing APRT is complex and nuanced. Although earlier position papers
46 have made explicit the definition for APRT and education expectations, (Duffton et al, 2019;
47 Leech and Coffey, 2018) there remains uncertainty in effectively operationalising APRT within a
48 service, while remaining agile to the changing practice landscape. Acknowledging that some
49 uncertainties are difficult to overcome, there is clear evidence demonstrating positive impact.
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51 The profession must work together internationally to advocate for APRT, embracing the
52 complexities and collaborating for maximum impact.
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Given the fluid development of APRTs globally, recommendations from this paper should be enablers for change. Implementation of the ICoP represents a positive step, with opportunities for individuals to collaborate, and address research. Work on impact should go beyond patient metrics and consider the educational, leadership and research benefits on the service. Empowering current APRTs as trailblazers, supported by the wider community, a cultural shift can enable APRTs to reach their full potential internationally, positively impacting the lives of patients.

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Declaration of interests

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