Advanced Practice Radiation Therapist (APRT) Guide and Tool Kit

Carrie Lavergne[1], Natalie Rozanec[2], Caitlin Gillan[2,3], Nicole Harnett[2,4]

1-R.S. McLaughlin Durham Regional Cancer Centre, Lakeridge Health Oshawa, 1 Hospital Ct, Oshawa, Canada

2-University of Toronto. 27 King's College Cir, Toronto, Canada

3-BC Cancer, Vancouver, British Columbia, Canada.

4-The Princess Margaret Cancer Centre, 610 University Ave, Toronto, Canada

This document was created with support from the CSRT Community of Practice.

This guide is intended for the use of anyone interested in developing or pursuing an Advanced Practice Radiation Therapy role in their Radiation Treatment Program.

March 2025 version

Contents

1.0 Introduction

This guide and toolkit was created by members of the Clinical Specialist Radiation Therapist (CSRT) Community of Practice (CoP) Advanced Practice (AP) Mentorship Network for new Advanced Practice Radiation Therapists (APRT)s or for departments interested in implemented advanced practice for the first time.

For the purposes of this document, we are referring to the APRT role as a radiation therapist (RTT), practicing in advanced practice as defined below by the Canadian Association of Medical Radiation Technologists (CAMRT):

> Advanced practice in Medical Radiation Technology is defined as a higher level of practice wherein clinical responsibilities routinely exceed the current principal expectations of practice. Advanced practice roles require analytical skills to synthesize evidence-based knowledge to autonomously work towards optimal patient outcomes. The Advanced Practice Medical Radiation Technologist (MRT) is able to practice in these roles due to their advanced clinical and theoretical knowledge, skill and judgment acquired through a relevant graduate level education program or equivalent[1].

Advanced Practice Registered Technologist (Radiation Therapy), or APRT(T), is the official professional title awarded by the CAMRT to RTTs who have successfully completed the three-stage CAMRT Advanced Practice Certification Process. The certification process is based on the APRT(T) competency profile (Appendix A), which is the nationally validated standard describing advanced radiation therapy practice in Canada[2].

The goals of this guide and tool kit are to provide new APRTs and their local team with the resources to confidently begin in new advanced roles, to create a robust learning trajectory, and to plan for success. It can be used in its entirety or in part, to meet the learning needs of each individual and their team.

We suggest you also review the advanced practice toolkit on the Cancer Care Ontario site[3]. Although written for Advanced Practice Nurses, the PEPPA (Participatory, Evidence-informed, Patient-centered process for Advanced practice nursing (APN) role) framework can easily be adapted for APRT roles. This toolkit will help you to develop strategies to successfully plan, and optimally implement an APRT role with maximum impact. See Figure 1 (adapted from the PEPPA framework)[1]:

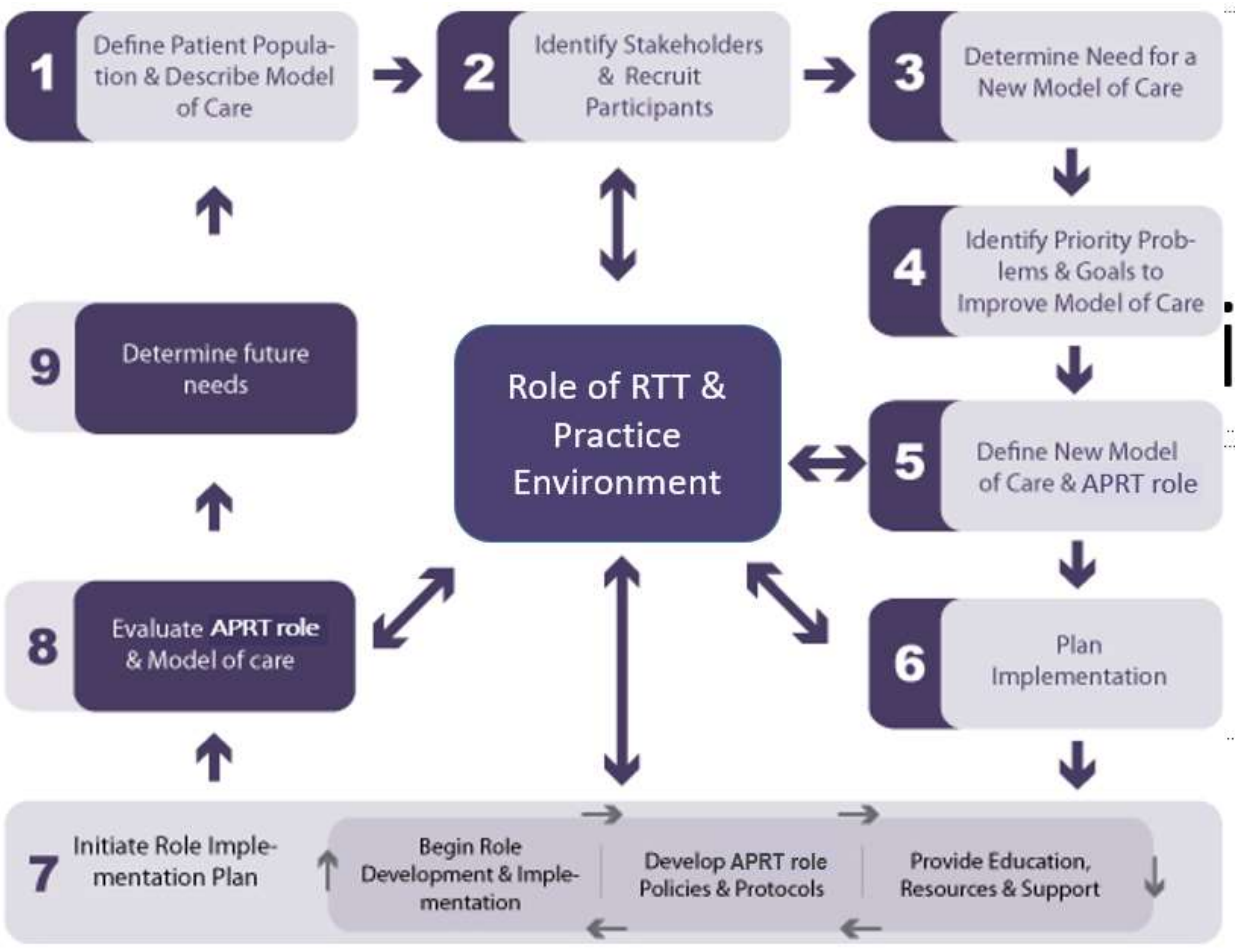


Figure 1. Process Map to follow for the implementation of an APRT role; adapted by the PEPPA Framework.

We have also provided a robust list of publications and resources that are specific to different types of APRT roles for your information and guidance (Appendix B). In many cases, the study design or metric that was used can be adopted or adapted for the work being done by new APRTs to measure the impact of their role.

1.1 Expectations of your Team

When starting the process of creating a new APRT role in your department it is imperative that you build a team of supporters to help you achieve your goals and ensure your success (see Step 2 of the PEPPA Framework). Ideally, this would include at minimum:

- Direct supervisor (ie. Radiation Oncologist (RO))
- Departmental supervisor (ie. Radiation Supervisor or Manager)
- CSRT CoP mentor (Refer to the Mentorship Framework)

The goal of this team is to meet at regularly scheduled intervals to discuss your progress, identify barriers and accomplishments, and set goals for your role.

Your Supervisor: usually, the main teacher/mentor/supervisor is a radiation oncologist with subject matter expertise in the area of specialization for the APRT. This will be your closest relationship as you develop competence. The activities expected of your direct supervisor include (but are not limited to):

- attending relevant new patient, on-treatment review and/or follow up clinics
- assigning you to other ROs for additional exposure
- conducting (or delegating) routine tutorials/drills to support your learning
- guidance on resources to contribute to your learning and skill development
- assessing your progress and providing you with feedback
- connecting you to other opportunities to learn
    - other clinics (ie. palliative care, dental clinics, lymphedema clinic, etc.)
    - other learning opportunities (ie. residents' teaching sessions, tumour boards, etc.)
    - other shadowing opportunities (ie. nurse practitioner, dietician, etc.)

Your Departmental Manager: your main line of reporting will usually be through your departmental manager. They should also be your lead champion and be able to navigate difficult situations with you while introducing the new role to the team. It is important to have regular contact with your manager to provide updates on progress, opportunities and challenges. They will also be instrumental in tracking your progress and identifying how/when to test your competence and move onto new learning goals.

Your mentor: all new APRTs should have an identified APRT mentor. This is someone who has navigated the APRT landscape either as an APRT themselves, or as a builder of the APRT concept. See Appendix C for more information about mentorship for new APRTs.

It is recommended for the APRT to have support from someone who can assist with data collection and analysis.

2.0 Getting Started

Typically, an APRT role will be developed de novo and as such, there will be little information to guide the APRT in their new role. There is likely a job description that was created in advance of this position. It is important that you work with your Team to continuously monitor and update your job description to ensure it accurately reflects your role. Examples of sample job descriptions are including in Appendix D.

In order to ensure that the new role meets the needs of the local environment while meeting the national competency profile requirements, the new APRT will need to begin gathering information about the needs of their local system and identify how an APRT will address those needs. The PEPPA Framework outlines a series of activities that will assist the new APRT gather this information to help set priorities and directions. Here, we call out a few specific critical tools and tasks that will help inform the implementation plan for a new APRT.

2.1 APRT Process Flow Map

To ensure that each APRT has a good understanding of the workflow and clinical processes within the area he/she will be working, each APRT should complete an exercise to map existing workflows and processes. The map should identify all the steps in the patient journey for the specified patient population that will be the focus of the APRT role (including the steps that do not include direct patient contact) and should highlight the activities along the care path that each member of the existing team plays. As the map is being created, the APRT should identify process gaps or bottlenecks that an APRT

could improve or rectify and mark these on the flow map with a short bullet point description on what change will be achieved. Some of the data on gaps or bottlenecks may already exist in your department based on data collected for other reasons (ie. patient satisfaction surveys, wait time studies, etc.) You may also wish to create a "current state" map and a "future state" map that will help to highlight the gaps that will be closed with an APRT. This information will then feed into planning for "how" the change will be achieved – including the learning and skills development that is required, the team members that are impacted, the measures that will be required to assess impact and success, etc.

For example, your centre may be experiencing long wait times between referral to consultation. In your process map, you may have identified that part of the reason for this long wait time is due to the volume of inappropriately referred patients that radiation oncologists are seeing. The APRT may, therefore, propose a review of the triaging process and implementation of a new process that can be undertaken by the APRT, subsequently measuring wait time changes/number of appropriate referrals across time to see if the change resulted in a reduction in the number of inappropriate referrals.

This link will take you to the Cancer Care Ontario website where the PEPPA Framework Tool Kit is posted[4]. Specifically, in *Step One: Define population and describe current model of care*, on pages 51 – 56, you will find information and strategies for building your process map. In addition, the Toolkit for Defining the Current Model of Care, Identifying Problems and Improving Care (Appendix E of the above document) is a more detailed guide for using several tools for mapping workflows and processes. It is not mandatory for you to conduct formal stakeholder sessions, but you should review your map with key members of the team to ensure you have captured everything correctly.

To Do List:

- Review pages 51 – 56 in the PEPPA Framework Tool Kit.
- Review process map examples in Appendix E.
- Review your job description and create a process map for your role. Review with your team members and update accordingly. Identify the activities that accompany each of the steps and assign the professional primarily responsible for the activity.
- Review the "A Toolkit for Defining the Current Model of Care, Identifying Problems and Improving Care", Appendix F.

2.2 Competency Development Plan

One of the expectations of you as you develop this new APRT position is that you will either hone existing advanced knowledge and skills or develop new ones that will serve to advance the objectives of the position, address the gaps that you have identified during your data gathering and process mapping, and to meet the standards outlined in the CAMRT Competency Profile. It will be up to you to establish what your learning needs or gaps are related to the development of each competency. The Competency Development Plan is created for you to clearly map out what you want to achieve, how you will achieve it and how you will know when you have achieved it. Built on an adult learning model of the "Learning Contract" you will use this plan to guide your education and skills development while building your position. Remember that it is a fluid document that will need revising as you learn more about what is expected in your position and as you achieve your goals.

We strongly suggest referring to the CAMRT APRT(T) Competency Profile, when creating your competency development plan[5]. This profile provides the basis of the three main pillars of advanced practice: clinical, technical and professional skills.

To Do List:

- Meet with your Direct Supervisor/team to identify the overall goals for the position.
- Review the CAMRT APRT(T) competency profile.
- Use the development table in Appendix G to map out your learning strategies relating the position expectations to your pre-existing knowledge and skills and identify any gaps that must be addressed.
- Document and review your learning map with your Direct Supervisor and your departmental supervisor and finalize.
- Disseminate achievement of competencies to improve stakeholder buy-in.

2.3 Measuring Impact

As the new role is being developed and implemented, the APRT will need to measure achievements and impacts with respect to patients, the system, the team and beyond. This will also include measuring the competence of the APRT (based on identified needs and the CAMRT Competency Profile). Below we have listed some of the highlights, but each role is unique and may require additional or different metrics to measure and demonstrate impact. In many cases, there are publications and resources related to these evaluation activities in Appendix B.

a) Concordance Projects

Each position needs to develop tailored project(s) to examine the APRT's ability to complete specified activities against a "gold standard". In most cases, the gold standard is a radiation oncologist or group of radiation oncologists, but could also include a medical physicist, nurse or other key allied health professionals on the team. The goal of this activity is to build evidence that the APRT is competent to complete the assigned activities. As this data will be unique for all sites, examples of different types of concordance information will be discussed, in general terms, for your reference. Historically, achieving a concordance level of 95% between the APRT and RO demonstrated acquisition of a competency or skill.

1. Patient Treatment Concordance: Data examining the APRT's recommendations for treatment type, patient management and medication use. Examples include:
   - Triage of patient referrals for appropriateness
   - Type of treatment recommended by the APRT (ie. 4-field or 2-field breast technique; prescription choice)[6,7]
   - Changes in treatment based on patient assessment (yes/no response; i.e., Did the APRT's recommendation correspond to that of the Radiation Oncologist?)
   - Detection and scoring of treatment side effects and planned course of management[6,8,9]
   - Medication(s) required for management of patient condition[6]

2. Treatment Planning Concordance: Data examining the APRTs' decisions for radiation treatment technique and dose and related decisions (i.e. bolus, etc.). Examples include:
   - Scan positioning and borders

- Placement of bolus or other ancillary equipment
- Immobilization technique
- Contouring of GTV, CTV and other regions of interest[6,7,10,11]
- Placement of field borders[6,7]
- Decisions about acceptability of a given treatment plan[8,10]
- Decisions regarding starting, stopping, pausing, adapting radiation treatment
- Type and magnitude of field and/or dose changes made by the Radiation Oncologist
- Evaluation of treatment verification images[12]

Once the APRT has established learning objectives and identified areas along the treatment trajectory where focus will be placed, the skills required can be identified. Once established, it will be up to the APRT and the supervisor/team to agree upon the appropriate methodology or test/tool to use to measure concordance between the APRT and relevant profession representing the 'gold standard'.

It is expected that the APRT will develop metrics with input from team members. This may include existing APRTs and their managers, Project Manager and Coordinator, and Research Analyst). Many of these metrics have been developed by existing APRTs and are available from the literature. For best practice, it is recommended to use consistent metrics with published literature wherever possible (See Appendix B).

To Do List:

- Once you have decided what knowledge and skills are to be developed and tested, you will have an understanding about what concordance activity(s) will be appropriate.
- Review the literature on published concordance studies done by other APRTs[6–12]
- Work with your Direct Supervisor, published literature and Project members to choose metrics for assessment of concordance for each competency/learning objective.

b) Other metrics

In addition to measuring concordance, the APRT will likely need to measure the impact of their role on the patient, team, and system. What is to be measured will be different depending on the identified needs of the local department and the intent of the role. Examples of the types of impact that can be measured include:

- changes in patient volumes
- time savings for radiation oncologists
- patient satisfaction with their care
- wait times across different points of the patient trajectory
- time that patient spends on the treatment bed
- machine utilization rates
- referral patterns from the local community

In most instances, there are existing tools that will help you collect data, including both baseline and post-APRT implementation data[13]. You can review the Standardized Metrics Toolkit published by Cancer Care Ontario for examples and guidance. Where new ideas surface, APRTs are encouraged to work with their team, their mentors and with the broader APRT community to develop a robust methodology.

To Do:

- Work with your Direct Supervisor, published literature, Standardized Metrics Toolkit, and Project members to identify what you will need to measure and what tools/methodology will be used.

3.0 Mentorship

A formalized mentorship program has been established, which aims to foster professional development, enhance clinical skills, and promote career advancement through a structured and supportive mentoring relationship between experienced practitioners and those seeking guidance in the field. This group is run through the Clinical Specialist Radiation Therapy (CSRT) Community of Practice (CoP). The Mentorship Program strives to meet the following objectives:

- Professional Development: Enhance the clinical, leadership, and research skills of mentees.
- Knowledge Sharing: Facilitate the exchange of knowledge and best practices in advanced radiation therapy.
- Career Guidance: Provide support and advice on career progression, including specialization and leadership opportunities.
- Networking: Create a network of professionals for ongoing support and collaboration.
- Advocacy: Support an advanced practice identity to ensure role sustainability and growth.
- Evaluation: Monitor and track the mentor/mentee relationships each year, confirming whether the mentorship process continues; decide if a new mentor-mentee pairing should occur.

To Do:

- If you would like to participate in the Mentorship Program, please see Appendix C and send an email with your application form and CV to csrt.cop@gmail.com.

4.0 APRT(T) Candidates: Portfolio Development

A portfolio is a collection of evidence gathered from a RTT's recent experiences, assembled to demonstrate competence. The portfolio provides a candidate with the opportunity to demonstrate the richness of their learning, skills, and experience in core clinical, technical, and professional domains through a compilation of tangible evidence.

We suggest using the APRT(T) Competency Profile to structure your portfolio[5]. This will ensure you are matching your competence with the accredited structure for advanced practice in radiation therapy. Furthermore, you will be that much further ahead for the APRT(T) certification!

It is important that you focus on the ***knowledge*** and ***skills*** you have derived from your education and experience, and not just the education/experiences themselves.

Helpful Hints:

- Generally, evidence used in your portfolio should be from within the previous five years.
- Types of Evidence:
  - Work samples – reports, email exchanges, etc.
  - Chart audits of completed cases

- Job descriptions
- Performance appraisals that highlight the advanced activities being completed
- Letters from employers, supervisors noting the contribution of the APRT in an advanced capacity
- Letters from teachers outlining significant contributions of the APRT
- Minutes of meetings that show advanced contributions to the work of the committee
- Academic transcripts
- Professional development transcripts
- Course descriptions of courses taken or taught
- Videos
- Reports or guidelines to which the APRT contributed
- Awards, grants or scholarships
- Copies of published work that the APRT contributed to (presentations, published abstracts, manuscripts, conference proceedings, etc.)
- Presentation materials

Specific details about the requirements and assessment of the APRT(T) portfolio can be found here, under section 3, with a detailed guide here.

To Do:

- Review the APRT(T) Competency Profile.
- Keep a folder (virtual and/or physical) to put all random pieces of evidence in as they come up. If you see an opportunity to evidence something, put it in! If you experience a situation that provides excellent evidence such as a verbal recommendation to the RO to prescribe an anti-emetic for a patient undergoing a large field of abdominal radiation: document it in the patient's chart and then take a screenshot; or email the RO, confirming your recommendation and asking them to confirm their response. Save that email thread, and put it in your portfolio.
- Begin collecting evidence!

5.0 AP Code Capture

As the CSRT Project Series concluded in 2015 and the CSRT positions continue and expand, it is crucial to continuously monitor CSRT work and impacts. The province of Ontario is the pioneer in APRT implementation and having standardized metrics to quantify clinical workload is essential for sustainability of these positions. A standardized AP activity list and definition enables consistent workload measurement and streamlining of these roles in different cancer centres nationally. Clinical workload is interaction or activity that was performed towards a patient's radiation therapy clinical care.

CSRT CoP formed an AP Workload Working Group (WG) to develop a standardized AP Activity List (APAL) to measure the clinical impact of CSRTs. The list was translated into 20 codes integrated into radiation therapy electronic medical record (RT-EMR) systems (2019). The purpose of the system is to permit competent APRTs to quantify the patient facing work that they do on a regular basis. While participation in the system is voluntary, this data is imperative for the APRT to understand their

individual role and to provide information to the central database so that the CSRT CoP can identify and report on trends or possible innovations.

There are many other activities and duties that APRTs perform that are not patient-facing but equally important to the full functioning of the APRT, such as research, leadership and teaching activities. The CSRT CoP is actively working on a system to collect that information and will have a process in place soon.

To Do:

- Read this paper on the AP Code Capture System[14].
- Discuss the value of your involvement in the system with your team.
- Email to csrt.cop@gmail.com to get signed up for access to the system.
- Work with your in-house clinical application specialist to setup your code capture system: Links here for assistance with Aria or Mosaiq . The working group will send out quarterly reminders to submit your codes to the Ontario Health CSRT CoP Share Drive, please submit according to the instructions on the Excel sheet.

6.0 Medical Directives

The World Health Organization has identified task shifting, or the redistribution of activities amongst the interdisciplinary team, as an established, effective and well-documented strategy for addressing shortages impacting access to healthcare[15]. One way in which this can be accomplished is through the use of medical directives and delegations, which can increase access to care and alleviate the burden on physicians. In the field of radiation oncology, medical directives and delegations can be granted to individual or groups of APRTs; with the advanced knowledge, skills and judgement, APRTs can autonomously carry out these additional tasks which improve efficiency and benefit the patient, the team and the system.

Orders, directives and delegations are authorizing mechanisms enabling the performance of a procedure, where the law, practice convention or circumstances requires such sanctioning[16].

Orders are directed from a regulated health professional with legislative ordering authority[16–18]. In the situation of an APRT, the order would be sanctioned by a Radiation Oncologist. There are two main types of orders: direct orders or medical directives.

A direct order is for a specific procedure, treatment or intervention, and is patient-specific. Direct orders are usually written, but can also be oral (for example, by telephone).

A medical directive is an order given by an authorizer (i.e. Radiation Oncologist) for a procedure, treatment or intervention that is for a specific population of patients who meet specific conditions. These are granted in advance, to enable the implementer (i.e. APRT) to perform the ordered procedure(s), when the specified conditions are met, without direct supervision from the authorizer. A medical directive must be written, and has essential components[16–18].

Delegation is overseen by the health care professional's regulator college. The College of Physicians and Surgeons (CPSO) defines delegation as a mechanism to allow a regulated health professional who is authorized to perform a controlled act, such as an RO, to temporarily grant the authority to perform a

controlled act to another person, such as an APRT[16]. Delegation does not negate the need for an order but allows the APRT to perform this procedure. Both delegating and accepting delegation of controlled acts must follow regulatory guidelines, standards and regulations. For Canadian APRTs, this area is governed by the CMRITO[1].

A medical directive and a delegated act can often be confused with one other, however they are not the same.

An example of the difference between delegation and a medical directive can be illustrated by considering the examples of (i) communicating a diagnosis, and (ii) ordering a bone scan. An APRT (on behalf of the RO) with a delegation can discuss with a palliative patient the pathology results from a lymph node biopsy confirming cancer. Communicating to an individual a diagnosis identifying a disease or disorder is controlled act #1, and therefore is a delegation.

In contrast, a medical directive can be created for an APRT to be able to order a bone scan for a patient with suspected bone metastases. The ordering of a nuclear medicine diagnostic imaging is not listed as a controlled act, and therefore the medical directive would authorize the APRT to decide to order the bone scan under specific conditions such as a patient with known metastatic disease, referred to radiation oncology at a specific institution, and presenting with new pain.

Several APRTs in Ontario have successfully achieved medical directives in their practice. These directives are available on the Ontario Sharepoint site, for APRTs practicing in Ontario. For a summarized list of directives, see Appendix H.

Implementing medical directives to enhance APRT practice can utilize a similar process as the PEPPA framework. The goal of this framework is to maximize patient health through effective redesign of the healthcare system. Figure 2 demonstrates a modified framework, to illustrate the relevance of this approach to implement medical directives for an APRT role.

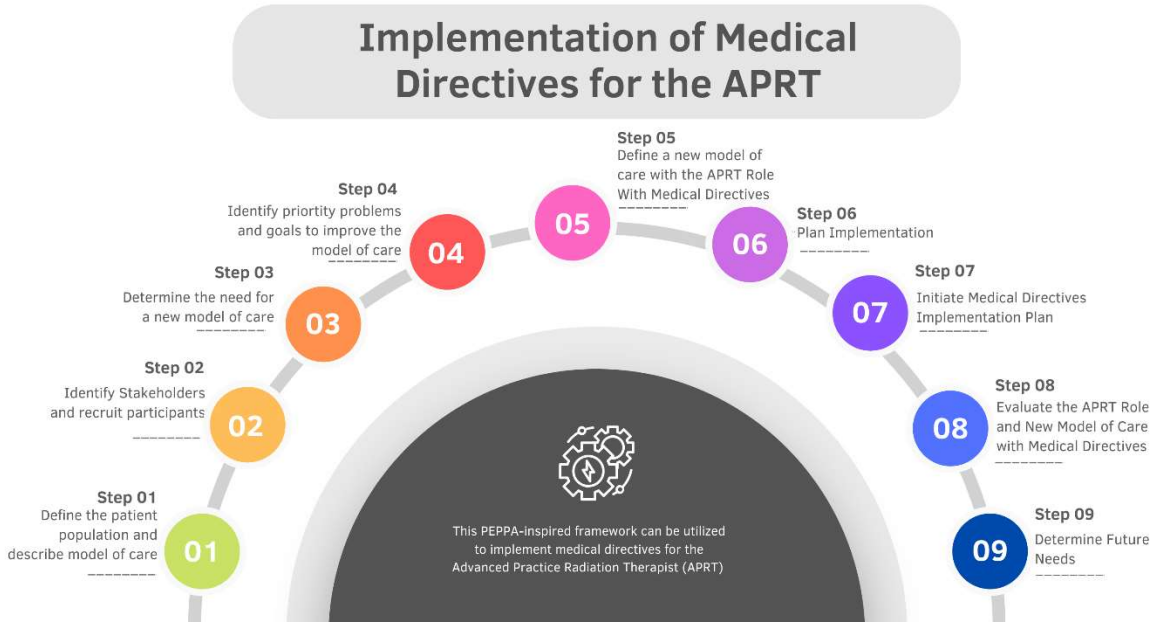


Figure 2. Implementation of Medical Directives for the APRT, utilizing a modified PEPPA Framework

For more information, please review the paper by C. Lavergne et al. (2025) [pending publication] regarding medical directives and implementation.

To Do:

- Review the medical directives paper. [pending]

- Once you have achieved and documented all competencies on the CAMRT's APRT(T) Competency Profile, meet with your clinical supervisor to discuss and identify which medical directives would be most appropriate for your work-flow. Determine whether you have gathered sufficient evidence to demonstrate concordance in practice for the identified directives. Once sufficient evidence has been obtained, discuss with your clinical supervisor whether these medical directives would be supported and signed off by all of the ROs in your department, or a subset of ROs. Guidance from your hospital's Office of Professional Practice (or equivalent) is recommended. Speak with a member of the medical administrative team to determine if hospital-specific templates exist for the purpose of writing up the medical directives needed, and inquire on which committees need to review and approve the directives.
- For further information, please refer to the CMRITO's Medical Directives and Delegation page at: Medical Directives & Delegation · CMRITO Portal (microsoftcrmportals.com).

7.0 Education and Teaching

Integral to any expert practice is engaging in the education and training of others. Once competent, the APRT will be called upon to teach student and junior RTTs, medical students, radiation oncology residents and fellows, patients and the general public, community stakeholders, funders and radiation medicine practitioners from other centres. In addition to building clinical and technical competence, the APRT will need to develop skills for educational and teaching activities with a systematic and thorough approach in order to have the maximum impact on learners.

A multitude of resources, models and frameworks to guide curriculum development, teaching and evaluation exist online and in published literature. In general, the key phases of complete curriculum design include:

1. Assess the needs of the learners
2. Develop objective that align with those needs
3. Select methods and approaches to teaching the required content
4. Implement the curriculum
5. Evaluate the effectiveness of the learning activity

In general, curriculum design approaches follow one of three types:

- Subject-centred
- Learner-centred
- Problem-centred

There are also a wide variety of instructional tools and techniques that a teacher can employ in meeting the learning needs of their learners. These should be considered when deciding what approach would

best support learning of the specific goals and objectives of the learning activities. Some examples of instructional methods include:

- lectures
- facilitated discussions
- group work
- simulated learning
- role playing
- problem-based learning

Again, APRTs should be able to use their knowledge of the strengths and weaknesses of the different approaches to choose the most suitable for the learning goals.

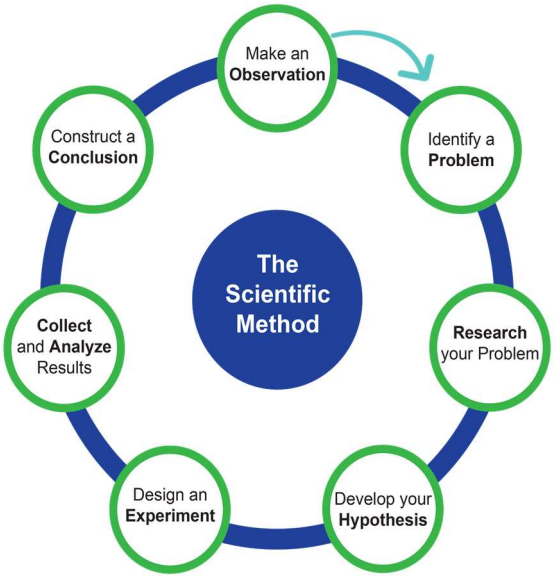
To Do List:

- Search 'curriculum design models'
- Search 'instructional strategies'
- Search 'adult learning theories'

8.0 Research & Scholarship

Creating and disseminating new knowledge are key expectations of any APRT. We have described the research that APRTs undertake to develop and test their new role, but there are many more opportunities to conduct, share, and adopt best practices based on others' research findings as part of advanced practice.

Research is an overarching term for any kind of investigation where a question is asked and results are collected and analyzed. It can be as big as a randomized control trial run by an international consortium, or as small as a quality improvement project looking at the configuration of seating in the patient waiting room. It can be quantitative in nature, or qualitative, or a combination of both. Regardless of the size or method of searching for the answer to a question, the scientific method should always be followed, whether formalized through a research protocol or just kept in mind while systematically working through a process of inquiry. Given the lack of inherent socialization in research culture, we may thus not leveraging associated opportunities, such as knowledge translation (presentation or publication), practice implementation, and academic credit. Through prioritizing related research knowledge, skills, and collaborations, APRTs can play an important role in building the knowledge base both in their clinical area of specialization as well as in broader APRT and radiation therapy practice.



Reference: www.arfreethinkers.org

As noted above, while our minds often go to what some call 'Capital R' research, or the formalized clinical trials, meta-analyses, and large comparative studies, there is much research that lends itself specifically to APRTs and their practice context. In fact, there are many 'small r' research questions that would go unasked and unaddressed if it weren't for an APRT to recognize a gap or inefficiency in their care environment. 'Small r' projects may be no less impactful than 'Capital R' projects, but are often not given as much attention or shared as broadly. They are often undertaken as local quality improvement initiatives but stop short of post-implementation evaluation or reporting, which limits the value of the work. The benefit of much of this work for a novice researcher is that many do not require as much formal oversight in terms of institutional research ethics approval or significant funding, though it remains important to ensure any such requirements are addressed responsibly. Comfort and experience in the research space, built through engagement in these types of projects, can often lead to more ambitious and formalized studies, and invitation to collaborate in more interprofessional work that would benefit from the unique APRT practice lens.

Associated with the idea of research as a pillar in APRT practice is the broader concept of scholarship. Scholarship, as it relates to the emerging professionalization of radiation therapists, is explored in depth by Nicole Harnett (CSRT Project Manager in Toronto, Ontario) in her chapter entitled "Academia & Scholarship" in the book *Research for the Radiation Therapists: from Question to Culture*[20]. She references Boyer's model of scholarship, which highlights the categories of Discovery, Integration, Application, and Teaching. Considering this more fulsome spectrum of engagement in academia can ensure that research has the ultimate intended impact in care, and also that those conducting research are well-immersed in supportive academic communities and collaborations.

Teaching is addressed elsewhere in this Toolkit, but it is helpful to consider how the APRT pillars of research, education, and leadership are interrelated. Seeking formal academic appointment (ie the role of Lecturer, Instructor, or higher level appointments at an academic institution affiliated with a cancer centre or hospital) is an increasingly available opportunity for academically-oriented radiation therapists. The inherent profile of APRTs can make them well-suited to paving the way for such opportunities where they may not yet inherently exist in some jurisdictions. Another chapter in

Research for the Radiation Therapist (Lisa DiProspero & Carol-Anne Davis (CAMRT APRT Certification Committee members))[21] reflects on associated strategies to build skills, connections, and culture to facilitate APRT engagement in research, including mentorship, communities of practice, journal clubs, and interprofessional collaborations. Attending radiation therapy conferences or volunteering as a reviewer for a professional journal, such as the *Journal of Medical Imaging & Radiation Sciences*, can also broaden one's appreciation for what constitutes 'research'. Such engagement can also mitigate the common issue of imposter syndrome, where we might feel that our research questions and efforts are not worthy of the same attention and consideration as that of our physician and scientist counterparts.

Whether it be project and change management resources to be leveraged to pursue a continuous quality improvement initiative, quantitative statistical analysis skills needed to mount a randomized control trial, or writing and presentation tips to engage in knowledge translation related to completed research, many resources exist that are more catered to the specific need than could be provided in detail in this Toolkit. In some areas, resources exist that are developed specifically within the radiation therapy or broader MRT domain, while others may be more generic to healthcare research or even other aligned areas. A selection of key resources is provided in Appendix B.

To Do List:

- Identify work you are doing (or plan to do) that could generate new ideas, way of working, or represent new knowledge for radiation therapists.
- Use sound research methodology design to convert the work into a research question and describe the work that will provide the answer to the question.
- Consult with a senior leader, mentor, supervisor on how to structure the work as a study and make plans for how and to whom you will disseminate your findings.

9.0 Curriculum Vitae

Having an updated curriculum vitae (CV) is very important in the academic community. The CV is a summary of your educational background, research and professional experiences.

The important sections that need to be included:

- contact information
- education
- employment and experience

Depending on your strengths, interests and experiences, the following sections should also be included:

- honours and awards (from post-secondary education)
- research (including peer reviewed and non-peer reviewed funding)
- professional affiliations and activities (committee memberships, relevant volunteer work)
- publications - both peer-reviewed and non-peer-reviewed
- presentations and special lectures
- teaching and design

Don't Tips:

- Don't think you have to do this alone! Ask for help from colleagues, advisors and mentors!
- Don't worry about the length of your CV. There are no length-restrictions.
- Don't include information surrounding your age; ethnicity; political or religious preferences; hobbies; marital status; sexual orientation; height/weights or photographs
- Don't include tons of detail about each research activity. Include the title of the research project and brief summary
- Don't include humour
- Don't forget to re-read for spelling and typographical errors

There are several excellent places for examples and templates. Furthermore, we have one of our team's CV as a guide/template to APRTs who are interested. Please email us for more information.

To Do List:

- Use the University of Toronto Department of Radiation Oncology CV template here (or similar from your local university)
- Ask colleagues for a copy of their CV
- Email csrt.cop@gmail.com for additional assistance

10.0 References

1. Canadian Association of Medical Radiation Technologists. Advanced Practice in Medical Radiation Technology - A Canadian Framework. 2015. Accessed September 17, 2024. https://www.camrt.ca/wp-content/uploads/2015/02/Advanced-Practice-in-Medical-Radiation-Technology-A-Canadian-Framework.pdf

2. Canadian Association of Medical Radiation Technologists. CAMRT Position - Use of APRT Titles for Therapists. December 15, 2023. Accessed September 17, 2024. https://www.camrt.ca/wp-content/uploads/2023/12/CAMRT-Position_Use-of-APRT-Titles-for-Therapists.pdf

3. Advanced Practice Nursing Toolkit | Cancer Care Ontario. Accessed September 17, 2024. https://www.cancercareontario.ca/en/guidelines-advice/treatment-modality/nursing-care/advanced-practice-nursing-toolkit

4. Advanced Practice Nursing Toolkit | Cancer Care Ontario. Accessed September 17, 2024. https://www.cancercareontario.ca/en/guidelines-advice/treatment-modality/nursing-care/advanced-practice-nursing-toolkit

5. Canadian Association of Medical Radiation Technologists. Advanced Practice Radiation Technologist (Radiation Therapy) Competency Profile. March 2022. Accessed September 17, 2024. https://www.camrt.ca/wp-content/uploads/2022/03/APRTT-Competency-Profile-2022-Mar-FINAL.pdf

6. Rozanec N, Cho C, Fenkell L, et al. Concordance of a Clinical Specialist Radiation Therapist and Radiation Oncologist: A Prospective Study involving Treatment Planning and Assessment of Patients Receiving Palliative Radiotherapy for Bone Metastases. *Journal of Medical Imaging and Radiation Sciences*. 2014;45(2):165-166. doi:10.1016/j.jmir.2014.03.019

7. Lavergne C, Barisic V. The Development of a Clinical Specialist Radiation Therapist Role, Specializing in Palliative Care in a Non-dedicated Palliative Care Clinic Structure. *Journal of Medical Imaging and Radiation Sciences*. 2016;47(1):S20-S21. doi:10.1016/j.jmir.2015.12.063

8. Sin SY, Chua MLK, Wong SMM, et al. An evaluation of concordance between head and neck advanced practice radiation therapist and radiation oncologists in toxicity assessment for nasopharyngeal carcinoma patients. *TPMNRO*. 2021;19:52-56. doi:10.1016/j.tipsro.2021.08.001

9. Lee G, Harnett N, Zychla L, Dinniwell RE. Radiotherapy treatment review: A prospective evaluation of concordance between clinical specialist radiation therapist and radiation oncologist in patient assessments. *JMIRS*. 2012;43(1):6-10. doi:10.1016/j.jmir.2011.10.001

10. Lee G, Dinniwell R, Liu FF, et al. Cavity delineation and plan review in breast radiotherapy: Concordance between clinical specialist radiation therapist and radiation oncologist. *JMIRS*. 2016;47(1):S5. doi:10.1016/j.jmir.2015.12.016

11. D'Alimonte L, Ravi A, Morton G. Prostate delineation for LDR prostate brachytherapy: Concordance study between clinical specialist radiation therapist and radiation oncologist. *Journal of Medical Imaging and Radiation Sciences*. 2018;49(3):S13-S14. doi:10.1016/j.jmir.2018.06.045

12. Holden L, Loblaw DA. Prospective evaluation of the concordance between radiation therapists and radiation oncologists on daily verification films. *CJMRT*. 2005;36(2):20-24. doi:10.1016/S0820-5930(09)60072-4

13. Cancer Care Ontario. CSRT Sustainability / Integration Project: Final Report - 2014/15. Published online August 11, 2015:134.

14. Chan K, Chan B, Linden K, et al. Framework Development: Standardizing Definition of Advanced Practice Radiation Therapy Activities for Clinical Workload Quantification. *Technical Innovations & Patient Support in Radiation Oncology*. 2024;29:100238. doi:10.1016/j.tipsro.2024.100238

15. World Health Organization. WHO | Task shifting: global recommendations and guidelines. WHO. Accessed August 26, 2020. https://www.who.int/workforcealliance/knowledge/resources/taskshifting_guidelines/en/

16. Health Profession Regulators of Ontario (HRPO). MD Guide Home - HPRO Guide. An Interprofessional Guide on the Use of Orders, Directives and Delegation for Regulated Health Professionals in Ontario. 2020. http://regulatedhealthprofessions.on.ca/md-guide-home.html

17. CMRITO. What you must know about ... performing procedures. April 2024. Accessed April 26, 2024. https://www.cmrito.org/pdfs/wymkas/performing-procedures.pdf

18. College of Nurses of Ontario. Practice Guideline: Medical Directives. 2020. Accessed April 19, 2024. https://www.cno.org/globalassets/docs/prac/41019_medicaldirectives.pdf

19. CSRT CoP. IMPACT: Influencing Models of Practice with Advanced Competency in Therapeutic Radiation. September 2024. Accessed September 17, 2024. https://www.camrt.ca/wp-content/uploads/2024/09/IMPACT-Edition-8.2-Fall-2024-10Sep2024.pdf

20. Harnett N. Chapter 13: Academia & Scholarship. In: *Research for the Radiation Therapist: From Question to Culture*. Apple Academic Press; 2014.

21. DiProspero L, Davis CA. Chapter 14: Getting Started: Building a Research and Evidence-Based Culture. In: *Research for the Radiation Therapist: From Question to Culture*. Apple Academic Press; 2014.

Appendix A: Competency Profile

Competency	Practical Interpretation
C1. Ensure that all relevant patient information is available for clinical decision making	• Includes the knowledge of what clinical information needs to be ordered and/or collected to inform decision making • Triage and initiation of referrals
C2. Assess the patient's physical condition	• Extends beyond informal assessment of patient physical condition when presenting for daily appointments • Includes entire trajectory from consultation to follow-up and covers general vitals, physical examination, and other clinical assessment skills (i.e., patient reported outcomes, etc.) • Includes entirety of history and physical examinations • Appreciating significance of related findings
C3. Assess the patient's cognitive condition and psychosocial status	• Extends beyond informal assessment of patient psychosocial condition when presenting for daily appointments and includes knowing what cognitive tools should be used and when/why • Includes entire trajectory from consultation to follow-up using cognitive assessment tools and evaluation of psychosocial condition through history-taking • Appreciating significance of related findings
C4. Obtain informed consent for required diagnostic procedures, therapeutic interventions or radiation therapy treatments	• Includes elements legally required for informed consent at all stages of the patient trajectory • Identification of issues related to capacity, substitute decision-makers, power of attorney and related actions
C5. Formulate and implement an appropriate approach for medical management	• Determination of appropriate overall medical management of a patient's diagnosis, including surgery, chemotherapy, radiation therapy, other, and the timing and concurrency of each • Includes revisions of care plan as necessary based on new information from a variety of sources

Competency	Practical Interpretation
	• Referrals to other providers or services to support navigation of patient journey, concordant with scopes of practice and patient needs
C6. Communicate results that will impact patient's course of treatment	• Meeting the standards to support delegation of disclosure of results of diagnostic tests • Ability to convey information and engage in discussion using language and a style that is appropriate to the situation and the patient, including conversations about diagnosis, prognosis, and compliance
C7. Prescribe/dispense pharmaceutical from defined and approved formulary	• Meeting the standards to support delegation of ordering pharmaceuticals from a specific formulary per specialization • Uses knowledge of indications, contraindications, interactions that would bear on decisions to start, continue, taper, stop specific medications
T1. Provide objective interpretation and evaluation of technical and radiobiological information	• Assessing and weighing of the relative significance of technical radiation therapy information necessary to inform technical, radiobiological, or clinical decisions • Using, where necessary, established tools/approaches to interpret the impact of the technical and/or radiobiological issue • Includes information that spans the radiation therapy trajectory from prescription through simulation, treatment planning, image guidance, and treatment
T2. Formulate and implement sound technical radiation therapy decisions based on integration of clinical, technical, and radiobiological information	• Acting on clinical and/or technical information or data gathered through assessment/evaluation to render technical decisions related to radiation therapy • Includes decisions that span the radiation therapy trajectory from prescription through simulation, treatment planning, image guidance, and treatment delivery

Competency	Practical Interpretation
R1. Conduct original research to contribute to the professional knowledge base	• Executes research as a leader including study design, research ethics board (REB), statistical analysis, knowledge translation and understands how results contribute to the knowledge base and to future work • Uses accepted tools/models/approaches
R2. Conducts quality improvement of program/service/ department as a member of the interprofessional health care team	• Identifies elements of practice that require examination, selects methods and metrics, works as part of the team to execute the project, communicates findings and formulates and executes changes as a result of findings • Uses accepted tools/models/approaches
R3. Lead the ongoing development of best practices using evidence-based approaches	• Is familiar with the standard sources of best practice information and engages in activities that facilitate adoption of identified best practices • Uses accepted tools/models/approaches
L1. Optimize the function of the health care team through continual assessment, audit, evaluation and strategic visioning as a key member of the interprofessional health care team	• Leads/engages in activities/discussions that plan for achieving articulated goals and in response to anticipated issues expected to impact practice • Uses relevant tools/models/approaches
L2. Create and maintain a functioning team	• Can lead and support team function to meet stated goals/objectives (in any domain) through identifying optimal team composition, team building, conflict resolution, division of labour, tracking progress, documentation, etc. • Uses relevant tools/models/approaches
L3. Coach and mentor staff, students, other health care providers	• Engages in effective coaching and mentorship relationships • Understands the challenges and pitfalls inherent in the various models/approaches to coaching and mentorship • Uses accepted tools/models/approaches

Competency	Practical Interpretation
E1. Develop an educational activity to address an identified need/gap	● Adopts/adapts common approaches to engage in effective educational activities at any level of learning including trainees, continuing education learners, and patients/public ● Includes needs assessment, curriculum building, instructional design and delivery, and evaluation ● Uses relevant tools/models/approaches

Appendix B: APRT Resources

All APRT

General APRT Information

- A roadmap for change: charting the course of the development of a new, advanced role for radiation therapists[2]
- Advanced practice roles of therapeutic radiographers/radiation therapists: A systematic literature review[3]

Oncology:

- Cancer Care Ontario Guidelines[3]
- Manual of Clinical Oncology - International Union Against Cancer[4]
- Devita, Hellman, and Rosenberg's Cancer, Principles and Practice of Oncology - Devita, Lawrence, and Rosenberg[5]

Radiation Oncology

- Gunderson & Tepper's Clinical Radiation Oncology[6]
- Khan's Treatment Planning in Radiation Oncology[7]
- QUANTEC[8]
- RadOncCalc[9]
- RadOncReview[10]
- RadOncReview Constraints[11]
- Radiation Oncology Wikipedia[12]

Physical Examinations:

- Bates' Guide to Physical Examination and History Taking - Bickley[13]
- ECOG Performance Status[14]

Anatomy:

- Sectional Anatomy for Imaging Professionals - Kelley and Petersen[15]
- IMAIOS – eAnatomy[16]
- ARC Bootcamp[17]
- Radiology Assistant[18]

Research & Scholarship

Comprehensive Resources

- Research for the Radiation Therapist: From Question to Culture[19]
- Research for Medical Imaging and Radiation Sciences[20]

Qualitative Research

- Using focus groups in radiation therapy research: ethical and practical considerations[21]
- Using qualitative measures to improve quality in Radiation Oncology[22]

Quantitative Research

- Statistical Analysis in Quantitative Research[23]

Academia & Scholarship

- The scholarly radiation therapist. Part one: charting the territory[24]
- The scholarly radiation therapist. Part two: developing an academic practiced - the Princess Margaret Hospital experience[25]
- Are you a researching radiation therapist?[26]

Academic Writing

- Writing your first paper: an informal guide for medical radiation sciences professionals[27]
- Writing your first paper Part 2: submission, review, and post-publication[28]

Radiation Therapy Research Networking

- MedRadJClub: The Twitter journal club for radiation professionals everywhere[29]

Palliative APRT

- LEAP (Learning Essential Approaches to Palliative Care) Course - Core[30]
- ASCO Guidelines – Patient and Supportive Care[31]
- Radiation Therapy for Brain Metastases: An ASTRO Clinical Practice Guideline[32]
- Palliative Radiation and Supportive Oncology (ASTRO Course)[33]
- External Beam Radiation Therapy for Palliation of Symptomatic Bone Metastases: An ASTRO Clinical Practice Guideline (2024)[34]
- Palliative Radiotherapy for Bone Metastases: An ASTRO Evidence-Based Guideline (2011)[35]
- Palliative radiation therapy for bone metastases: Update of an ASTRO Evidence-Based Guideline (2017)[36]
- ASTRO Model Policies - Stereotactic Body Radiation Therapy (SBRT)[37]

Head & Neck APRT

- Target Volume Delineation for Conformal and Intensity-Modulated Radiation Therapy[38]
- CT-based delineation of organs at risk in the head and neck region: DAHANCA, EORTC, GORTEC, HKNPCSG, NCIC CTG, NCRI, NRG Oncology and TROG consensus guidelines[39]
- Oral Mucositis (WHO and NCI grading scales)[40]
- Oral Care (Mouth Care) – Cancer Care Ontario[41]
- Cancer Care Ontario Guidelines – Head & Neck Cancers[42]
- TNM Staging of Head and Neck Cancer and Neck Dissection Classification (4th Ed)[43]
- ASCO Guidelines – Head and Neck Cancer[44]

Breast Cancer APRT

- Cancer Care Ontario Guidelines – Breast Cancer[45]
- ASCO Guidelines – Breast Cancer[46]

IGART APRT

- Pending.

SBRT APRT

- ASTRO Model Policies - Stereotactic Body Radiation Therapy (SBRT)[37]

Brachytherapy APRT

- Pending.

General References

1. Bryant-Lukosius D, DiCenso A. A framework for the introduction and evaluation of advanced practice nursing roles. *J Adv Nurs*. 2004;48(5):530-540. doi:10.1111/j.1365-2648.2004.03235.x

2. Harnett N, Bak K, Zychla L, Lockhart E. A roadmap for change: charting the course of the development of a new, advanced role for radiation therapists. *J Allied Health*. 2014;43(2):110-116.

3. Oliveira C, Barbosa B, Couto JG, Bravo I, Khine R, McNair H. Advanced practice roles of therapeutic radiographers/radiation therapists: A systematic literature review. *Radiography (Lond)*. 2022;28(3):605-619. doi:10.1016/j.radi.2022.04.009

4. Displaying Guidelines | Cancer Care Ontario. Accessed September 19, 2024. https://www.cancercareontario.ca/en/guidelines-advice/types-of-cancer

5. UICC Manual of Clinical Oncology, 9th Edition | Wiley. Wiley.com. Accessed September 19, 2024. https://www.wiley.com/en-ca/UICC+Manual+of+Clinical+Oncology%2C+9th+Edition-p-9781119013129

6. DeVita, Hellman, and Rosenberg's Cancer: Principles & Practice of Oncology. Accessed September 19, 2024. https://www.wolterskluwer.com/en/know/cancer-principles-and-practice-of-oncology

7. Gunderson and Tepper's Clinical Radiation Oncolo - 9780323672467. US Elsevier Health. Accessed September 19, 2024. https://www.us.elsevierhealth.com/gunderson-and-teppers-clinical-radiation-oncology-9780323672467.html

8. Khan's Treatment Planning in Radiation Oncology. Accessed September 19, 2024. https://shop.lww.com/Khan-s-Treatment-Planning-in-Radiation-Oncology/p/9781975162016

9. Bentzen SM, Constine LS, Deasy JO, et al. Quantitative Analyses of Normal Tissue Effects in the Clinic (QUANTEC): An Introduction to the Scientific Issues. *Int J Radiat Oncol Biol Phys*. 2010;76(3 Suppl):S3-S9. doi:10.1016/j.ijrobp.2009.09.040

10. RadOncCalc. Accessed September 19, 2024. https://radonccalc.radoncreview.org/#/

11. Rad Onc Review | Radiation Oncology Review. RadOncReview. Accessed September 19, 2024. https://www.radoncreview.org

12. Constraints. RadOncReview. Accessed September 19, 2024. https://www.radoncreview.org/constraints

13. Radiation Oncology - Wikibooks, open books for an open world. Accessed September 19, 2024. https://en.wikibooks.org/wiki/Radiation_Oncology

14. Bates' Guide To Physical Examination and History ... Accessed September 19, 2024. https://shop.lww.com/Bates--Guide-To-Physical-Examination-and-History-Taking-13e-with-Videos-Lippincott-Connect-Print-Book-and-Digi/p/9781975210878

15. ECOG Performance Status Scale. ECOG-ACRIN Cancer Research Group. Accessed September 19, 2024. https://ecog-acrin.org/resources/ecog-performance-status/

16. Sectional Anatomy for Imaging Professionals, 4th Edition - 9780323414876. Accessed September 19, 2024. https://evolve.elsevier.com/cs/product/9780323414876?role=student

17. e-Anatomy, the Anatomy of Imaging. IMAIOS. Accessed September 19, 2024. https://www.imaios.com/en/e-anatomy

18. Anatomy and Radiology Contouring Bootcamp for Radiation Oncology Residents. ARC Bootcamp. Accessed September 19, 2024. https://www.arcbootcamp.com/

19. The Radiology Assistant : Home. Accessed September 19, 2024. https://radiologyassistant.nl/

20. Research for the Radiation Therapist: From Question to Culture - 1st E. Accessed September 19, 2024. https://www.routledge.com/Research-for-the-Radiation-Therapist-From-Question-to-Culture/Gillan-DiProspero-Harnett-Holden/p/book/9781774633236

21. Seeram E, Davidson R, England A, McEntee MF, eds. *Research for Medical Imaging and Radiation Sciences*. Springer International Publishing; 2021. doi:10.1007/978-3-030-79956-4

22. Wright CA, Schneider-Kolsky ME, Jolly B, Baird MA. Using focus groups in radiation therapy research: Ethical and practical considerations. *Journal of Radiotherapy in Practice*. 2012;11(4):217-228. doi:10.1017/S1460396911000379

23. Harrison AS, Yu Y, Dicker AP, Doyle LA. Using qualitative measures to improve quality in radiation oncology. *Am J Med Qual*. 2013;28(4):345-351. doi:10.1177/1062860612461826

24. Zheng X. Statistical Analysis in Quantitative Research. In: *Research Methods for Student Radiographers*. CRC Press; 2021.

25. Harnett N, Palmer C, Bolderston A, Wenz J, Catton P. The scholarly radiation therapist. Part one: charting the territory. *Journal of Radiotherapy in Practice*. 2008;7(2):99-104. doi:10.1017/S1460396908006341

26. Bolderston A, Harnett N, Palmer C, Wenz J, Catton P. The scholarly radiation therapist. Part two: developing an academic practice—the Princess Margaret Hospital experience. *Journal of Radiotherapy in Practice*. 2008;7(2):105-111. doi:10.1017/S1460396908006328

27. Li W. Are You a Researching Radiation Therapist? *Journal of Medical Imaging and Radiation Sciences*. 2014;45(4):346-347. doi:10.1016/j.jmir.2014.07.007

28. Murphy A, Bolderston A. Writing your first paper: An informal guide for medical radiation sciences professionals. *J Med Imaging Radiat Sci*. 2021;52(3):456-465. doi:10.1016/j.jmir.2021.06.008

29. Murphy A, Bolderston A. Writing your first paper Part 2: Submission, review, and post-publication. *Journal of Medical Imaging and Radiation Sciences*. 2022;53(3):478-486. doi:10.1016/j.jmir.2022.05.004

30. medradjclub | The Twitter journal club for medical radiation professionals everywhere! Accessed September 19, 2024. https://medradjclub.wordpress.com/

31. LEAP™ Core. Pallium Canada. Accessed September 19, 2024. https://www.pallium.ca/course/leap-core/

32. Patient and Survivor Care. ASCO. Accessed September 19, 2024. https://society.asco.org/practice-patients/guidelines/patient-and-survivor-care

33. Gondi V, Bauman G, Bradfield L, et al. Radiation Therapy for Brain Metastases: An ASTRO Clinical Practice Guideline. *Practical Radiation Oncology*. 2022;12(4):265-282. doi:10.1016/j.prro.2022.02.003

34. Palliative Radiation and Supportive Oncology | ASTRO. Accessed September 19, 2024. https://academy.astro.org/content/palliative-radiation-and-supportive-oncology

35. Alcorn S, Cortés ÁA, Bradfield L, et al. External Beam Radiation Therapy for Palliation of Symptomatic Bone Metastases: An ASTRO Clinical Practice Guideline. *Practical Radiation Oncology*. 2024;14(5):377-397. doi:10.1016/j.prro.2024.04.018

36. Lutz S, Berk L, Chang E, et al. Palliative Radiotherapy for Bone Metastases: An ASTRO Evidence-Based Guideline. *International Journal of Radiation Oncology, Biology, Physics*. 2011;79(4):965-976. doi:10.1016/j.ijrobp.2010.11.026

37. Lutz S, Balboni T, Jones J, et al. Palliative radiation therapy for bone metastases: Update of an ASTRO Evidence-Based Guideline. *Practical Radiation Oncology*. 2017;7(1):4-12. doi:10.1016/j.prro.2016.08.001

38. ASTRO. ASTRO Model Policies - Stereotactic Body Radiation Therapy (SBRT). 2020. Accessed September 19, 2024. https://www.astro.org/ASTRO/media/ASTRO/Daily%20Practice/PDFs/ASTROSBRTModelPolicy.pdf

39. Lee NY, Riaz N, Lu JJ, eds. *Target Volume Delineation for Conformal and Intensity-Modulated Radiation Therapy*. Springer International Publishing; 2015. doi:10.1007/978-3-319-05726-2

40. Brouwer CL, Steenbakkers RJHM, Bourhis J, et al. CT-based delineation of organs at risk in the head and neck region: DAHANCA, EORTC, GORTEC, HKNPCSG, NCIC CTG, NCRI, NRG Oncology and TROG

consensus guidelines. *Radiotherapy and Oncology*. 2015;117(1):83-90. doi:10.1016/j.radonc.2015.07.041

41. Bell A, Kasi A. Oral Mucositis. In: *StatPearls*. StatPearls Publishing; 2024. Accessed September 19, 2024. http://www.ncbi.nlm.nih.gov/books/NBK565848/

42. Oral Care (Mouth Care). Accessed September 19, 2024. https://www.cancercareontario.ca/en/symptom-management/3156

43. Cancer Care Ontario. Head & Neck Cancers | Cancer Care Ontario. Accessed September 19, 2024. https://www.cancercareontario.ca/en/guidelines-advice/types-of-cancer/head-and-neck

44. American Academy of Otolaryngology - Head & Neck Surgery. TNM Staging of Head and Neck Cancer and Neck Dissection Classification (4th ed). 2014. Accessed September 19, 2024. https://www.entnet.org/wp-content/uploads/files/NeckDissection_QuickRefGuide_highresFINAL.pdf

45. Head and Neck Cancer. ASCO. Accessed September 19, 2024. https://society.asco.org/practice-patients/guidelines/head-and-neck-cancer

46. Cancer Care Ontario. Breast Cancer Guidelines | Cancer Care Ontario. Accessed September 19, 2024. https://www.cancercareontario.ca/en/guidelines-advice/types-of-cancer/breast

47. Breast Cancer. ASCO. Accessed September 19, 2024. https://society.asco.org/practice-patients/guidelines/breast-cancer

48. Erler D, Gillan C. Tools of the trade: Untangling medical directives, delegations, and the medical radiation technology regulatory landscape in Ontario☆☆★. J Med Imaging Radiat Sci. 2025 Mar 7;56(3):101864. doi: 10.1016/j.jmir.2025.101864. Epub ahead of print. PMID: 40056756.

Appendix C: Mentorship Program: Advanced Practice in Radiation Therapy

Mentorship Terms of Reference

1. Purpose

This Mentorship Program aims to foster professional development, enhance clinical skills, and promote career advancement through a structured and supportive mentoring relationship between experienced practitioners and those seeking guidance in the field. This group will be run through the Clinical Specialist Radiation Therapy (CSRT) Community of Practice (CoP).

2. Objectives

- Professional Development: Enhance the clinical, leadership, and research skills of mentees.
- Knowledge Sharing: Facilitate the exchange of knowledge and best practices in advanced radiation therapy.
- Career Guidance: Provide support and advice on career progression, including specialization and leadership opportunities.
- Networking: Create a network of professionals for ongoing support and collaboration.
- Advocacy: Support an advanced practice identity to ensure role sustainability and growth.
- Evaluation: Monitor and track the mentor/mentee relationships each year, confirming whether mentorship process continues; decide if a new mentor-mentee pairing should occur.

3. Structure of APRT Mentorship Program

This voluntary committee will consist of a minimum of one CoP Lead, and members of the CoP Advanced Practice (AP) Mentorship Network Working Group. Together, this group will:

- Oversee, evaluate and adapt the mentorship program.
- Work with the CoP to match mentors with mentees appropriately based on needs, interests and goals of mentees and mentors.
- Keep a historical list and/or database of mentors/mentees.
- Schedule an annual review with each mentor/mentee relationship annually.
- Be available for conflict resolution.
- Direct mentees to online tools.
- Attend a yearly Celebration.

4. Eligibility:

- Mentors: Experienced radiation therapists with a minimum of 5 years in advanced practice roles and/or have achieved APRT(T) certification

- Mentees: Radiation therapists seeking to advance their careers in specialized or leadership roles, focusing on an advanced practice career path

5. Selection Process:

• Mentors: Must apply and demonstrate their experience, willingness to commit time, and desire to support professional growth in others.

• Mentees: Must apply and indicate specific areas of interest, goals, and a commitment to participate actively.

- It is advisable that mentors and mentees meet for a minimum of a half hour quarterly; the mentor and mentee can finalize expectations for time commitment at their first meeting.

6. Roles and Responsibilities

Mentors:

- Provide guidance and support tailored to the mentee's goals.
- Share knowledge, resources, and experience.
- Commit to regular meetings and maintain confidentiality.
- Encourage mentees to pursue professional development opportunities.
  - Mentors and mentees should honour commitment to a safe environment and confidentiality and should have explicit discussion about this aspect of their relationship.

Mentees:

- Actively engage in the mentorship process.
- Set clear professional goals and work towards achieving them.
- Respect the mentor's time and expertise.
- Maintain confidentiality and professionalism in all interactions.

Please direct any questions regarding the Mentorship Program to mailto:csrt.cop@gmail.com.

Appendix D: Job Descriptions

Job Description Sample 1

1. Role - Position Identification

Position Title: Clinical Specialist Radiation Therapist, XXXX
Name of Incumbent: _____
Department: _____
Reports to (Title): _____
Key Relationship(s): _____
Date Completed: _____

2. Areas of Responsibility

The Clinical Specialist Radiation Therapist (CSRT) will enhance radiation therapy practice and patient-focused outcomes for patients undergoing XXXX through expanded, direct and comprehensive care, education, research, and practice, professional, and organizational leadership. The Clinical Specialist XXXX Radiation Therapist is a registered Radiation Therapist who has acquired advanced knowledge and skills through a combination of workplace learning, formal courses and/or professional development activities. They are a highly competent academic practitioner with advanced knowledge, skills and judgment permitting autonomous clinical practice in the management of patients undergoing radiation treatment for XXX disease. The CSRT will integrate theoretical, research and practical knowledge to exercise sound judgment across complex and varying social, cultural and organizational contexts making a unique and significant contribution to the timely provision of excellent radiation therapy treatment and patient care in the cancer care system.

CSRT Roles and Responsibilities:

The CSRT will play an integral role for XXXX patients referred to the XXXX. By liaising with various site groups and team members, and triaging patients as required, the individual will be able to facilitate appropriate and efficient movement of the patient through the system. The individual will function within the interdisciplinary healthcare team by providing comprehensive assessment, and referral of patients, as well as technical evaluation of all aspects of treatment delivery. This individual will be responsible for ensuring quality patient care as part of the multidisciplinary health care team with a focus on ensuring continuity of care from referral to follow up and efficient navigation of the patient through the system. With a high level of autonomy, the CSRT will formulate care plans in conjunction with the radiation oncologist, patient/family/caregiver, and other professionals as required. The CSRT will conduct ongoing assessment of the patient, provide education to the patient on expected toxicities and ongoing support for the management of those toxicities, as well as participate in weekly review and/or follow up care. From a technical standpoint, the CSRT will provide guidance on patient positioning, planning parameters and treatment verification. The CSRT will serve as a consultant within the interdisciplinary and multi-site XXXX team and provide education and mentorship to others. At the program level, the CSRT will apply leadership, research and educational expertise to enhance the application of evidence-based practice, principles of best practice, and quality practices.

Clinical Practice (50 - 80 %)

The CSRT will work as a member of the XXXX interdisciplinary care team to provide optimal patient care for patients undergoing XXXX in accordance with the scope of practice, medical directives/protocols and practice guidelines. They will also utilize their advanced technical knowledge to function as an expert in the XXXX program. Responsibilities may include but are not limited to:

a) Triage patients to ensure identification of patients suitable for XXXX and the various trials and protocols at the appropriate urgency level
b) Assess patient before, during and after radiation therapy, for physical and psychosocial distress with appropriate documentation of findings or referrals
c) Act as a patient navigator to ensure patients identified for XXXX traverse through the system efficiently
d) Formulate, implement, and continuously assess effectiveness of patient's medical care plan
e) Consult, as part of the interdisciplinary team, on relevant patient cases
f) Act as a resource and central coordinating individual across all the site groups using XXXX
g) Provide technical and dosimetric consultation at all phases of the radiation therapy planning and treatment process
h) Accurately locate relevant target volumes, organs at risk and regions of interest for use in the creation of an optimized treatment plan and assess optimized treatment plans
i) Approve treatment unit verification/localization images and image guidance shift trends where applicable
j) Apply advanced technical knowledge to improve the integration of existing, or facilitate the application of new technology throughout practice where applicable

Education & Staff Development (10 - 25 %)

a) Create and maintain a learner-centered environment for staff and student learners
b) Assess learning needs of new radiation therapists rotating to XXXX machines using a variety of inputs
c) Provide opportunities for ongoing professional development of staff by delivering presentations and educational sessions, creating learning plans and materials as required
d) Provide training to radiation therapists in Planning or Treatment Units on any new XXXX protocols/ techniques/equipment
e) Assess staff knowledge of XXXX, identify need for remediation and collaborate with Clinical Educators to provide remediation
f) Lead and participate in the development, implementation and evaluation of educational activities and materials designed to meet the learning needs of patients, families and caregivers

Leadership/Change Agent (10 - 25 %)

a) Contribute to the optimal function of the health care team through continual assessment, evaluation and self-reflection
b) Collaborate with others across the intra and interprofessional team for broad change initiatives

c) Optimize awareness and utilization of a program/service through communication, promotion and advocacy
d) Participate in strategic planning and goal setting for the program or service
e) Contribute to a culture of patient safety and continuous improvement by supporting an environment of psychological safety, reporting, accountability, teamwork and engagement
f) Participate and provide leadership related to the development of policies and procedures, education, and research in XXXX

Knowledge Mobilizer/ Scholar/Researcher (10 - 25%)

a) Lead research/academic scholarship initiatives and quality improvement work for the XXXX group
b) Contribute to the scholarly endeavors of the XXXX team through collaboration and participation in existing research studies
c) Identify care gaps and lead/participate in integrating evidence-informed interventions
d) Present research findings at conferences, rounds and in-services.
e) Supports knowledge mobilization between the intra and interprofessional team

3. Eligibility Requirements

- Qualified Radiation Therapist Registered with College of Medical Radiation and Imaging Technologists of Ontario (CMRITO)
- Minimum 5 years' experience in the field of Radiation Therapy
- Bachelor of Science Degree
- Master's Degree in related field (or "in progress") preferred
- CPR Certified
- Strong interpersonal and team-based skills
- Proven leadership skills
- Able to work independently with a minimum of direction
- Excellent communication and organizational skills
- Demonstration of research experience
- Strong knowledge of XXXX, indications, treatment planning, imaging, etc., physiology, disease progression and management of radiation therapy related side effects
- Awareness of legislation relevant to the position
- Willing to work towards APRT(T) certification with the CAMRT
- Have or be willing to seek an academic appointment with the University of Toronto Department of Radiation Oncology

Job Description 2: Advanced Practice Radiation Therapist -

Job Summary:

The Advanced Practice Radiation Therapist (APRT) is an experienced radiation therapist, highly competent and academic member of the department of radiation therapy. The APRT demonstrates leadership and advanced knowledge, skills and judgment in the clinical and technical aspects of the care of patients receiving radiation therapy to optimize radiation therapy treatment and improve patient health outcomes. APRT(T)s can work at all stages of the patient journey with a focus on effectiveness, efficiency, and evidence-based practice.

The APRT requires advanced analytical skills to synthesize evidence-based knowledge to autonomously work towards optimal patient outcomes. The APRT is a self-regulated health care professional who practices within defined scope of employment to autonomously triage, assess, prescribe, plan, coordinate and manage a defined patient population referred for radiation treatment. The APRT will integrate research, theory and evidence based practice within a variety of socio-cultural and organizational contexts, to deliver timely, patient-centered care.

The APRT will collaborate with members of the cancer care team to promote research, education and other strategic goals of the program. As such, the accountability and responsibility for the APRT will include clinical and technical practice, quality, education, research, innovation and leadership activities and initiatives.

The APRT will:

a) Provide holistic patient care to a defined population including:
    a. Triaging of patient referrals for radiation in collaboration with the cancer care team
    b. Conducting history, physical exam and comprehensive patient assessments to assess for appropriateness of radiation therapy
    c. Prescribing of a course of radiation therapy including target delineation
    d. Review and approval Radiation treatment plan
    e. Providing information and education to obtain informed consent to treatment
    f. Provide instruction and guidance with respect to Treatment setups and image guidance
    g. Monitoring and assessment of side effects and response to treatment
    h. Follow-up for the defined patient population.
b) Collaborate with the cancer care team to develop, implement and evaluate overall patient care plans.
c) Coordinates referrals as appropriate to care providers, services and resources based on needs
d) Introduces and integrates the APRT role with patients, radiation therapists, members of the NSH oncology teams, and with referring and community partners.
e) Participate in activities designed to measure the development and success of the implementation of the role and achievement of associated outcomes.
f) Provide leadership in continuous quality improvement committees and initiatives to improve patient care.

g) Provide leadership and contribute towards research in the management of patients within radiation therapy.

h) Participate in development and regular updating of policies and procedures, protocols, process maps and clinical pathways for the role and NSH CCP program.

Clinical Duties

The APRT works as a member of the interprofessional team to provide optimal patient care for patients

1. Analyzes and synthesizes available patient information to ensure that all needed information is available for clinical decision making; including ordering any relevant procedures that may not have been completed.
2. Assess and interprets the patient physical, cognitive and psychosocial status using all available relevant information and techniques; including physical/clinical examination, patient history, diagnostic imaging, laboratory or pathology tests, validated tool/documents and any additional pertinent information.
3. Formulates and implements an appropriate patient care and/or treatment plan with demonstrated understanding from patient/family member's goals of care.
4. Provides ongoing monitoring of patient's response to treatment plan; including associated side effects and toxicities
5. Obtains informed consent from patient/substitute decision maker for diagnostic and therapeutic interventions.
6. Communicates to patients the results of specific tests/procedures.
7. Liaise with the patient care team on the pharmaceutical management of patient symptoms and side effects from a defined and approved list for discrete and specified conditions (e.g. pain management, radiation treatment sequelae etc.).
8. Refer cases that fall outside of standard protocol to radiation oncologist or other appropriate health care professional or service.

Technical Duties

The APRT uses advanced oncologic, radiobiological and dosimetric knowledge to optimize the use of available technology for the provision of tailored radiation therapy treatment to patients

1. Provides autonomous technical consultation and expertise at all phases of the radiation therapy planning and treatment process through integration of relevant clinical, diagnostic and technical information.
2. Utilizes relevant patient information to provide specific consultation as it relates to: patient positioning and immobilization, field placement, treatment accessories, image guidance and simulation
3. Implement decisions regarding technical treatment accuracy and precision and dose/fractionation appropriateness by interpreting and integrating available clinical, technical and radiobiological information

4. Order/employ appropriate Diagnostic Imaging studies to optimize visualization of the regions of interest for planning purposes.
5. Analyzes information to critically examine the position of anatomy compared to identified radiation treatment volumes.
6. Employ clinical decision making skills to order a hold, adapt or replan of original planned treatment. Refer cases that fall out of standard protocol to radiation oncologist or other radiation medicine professional.

Professional Duties

The APRT uses research and evidence-based practice principles to serve as a quality champion, influencer, role model, mentor and innovator in radiation therapy and particularly in their area of specialization

Quality, safety, service enhancement:

1. Promote, advocate and employ evidence-based approaches to develop and engage in best professional practice.
2. Contribute to ongoing program review and audit and develop strategies to address findings.
3. Continually monitor existing departmental quality assurance processes and safety procedures, taking action where gaps or deviations are identified.

Leadership:

1. Contribute to the optimal function of the health care team through continual assessment, audit, evaluation and strategic visioning.
2. Participate in knowledge dissemination and translation related to innovation and research through communication, promotion and advocacy.
3. Provide clinical supervision, preceptorship, education and mentoring for students/new hires as required.
4. Identifies, achieves, and maintains own professional development needs and competencies, seeks appropriate learning opportunities and evaluates own learning.
5. Demonstrate understanding of and respect for the scope of practice and expertise of other members of the health team.

Research:

1. Participate in the development and advancement of the radiation therapy program, and overall health service evidence-based knowledge through the conduct of research as investigator.
2. Build an academic career research platform to contribute to practice development/innovation in area of specialty.
3. KPIs related to APRT role provincially/locally

Education:

1. Assess the learning needs of target audience (e.g. students, patients/family, community, other health care professionals).

2. Designs an effective learning plan and educational materials using a variety of formats based on the education activity and target audience.
3. Delivers effective, person-centered educational interventions to colleagues and department stakeholders.
4. Evaluates education intervention to revise, identify need for remediation or adjust processes or materials as required.

Skills and Abilities

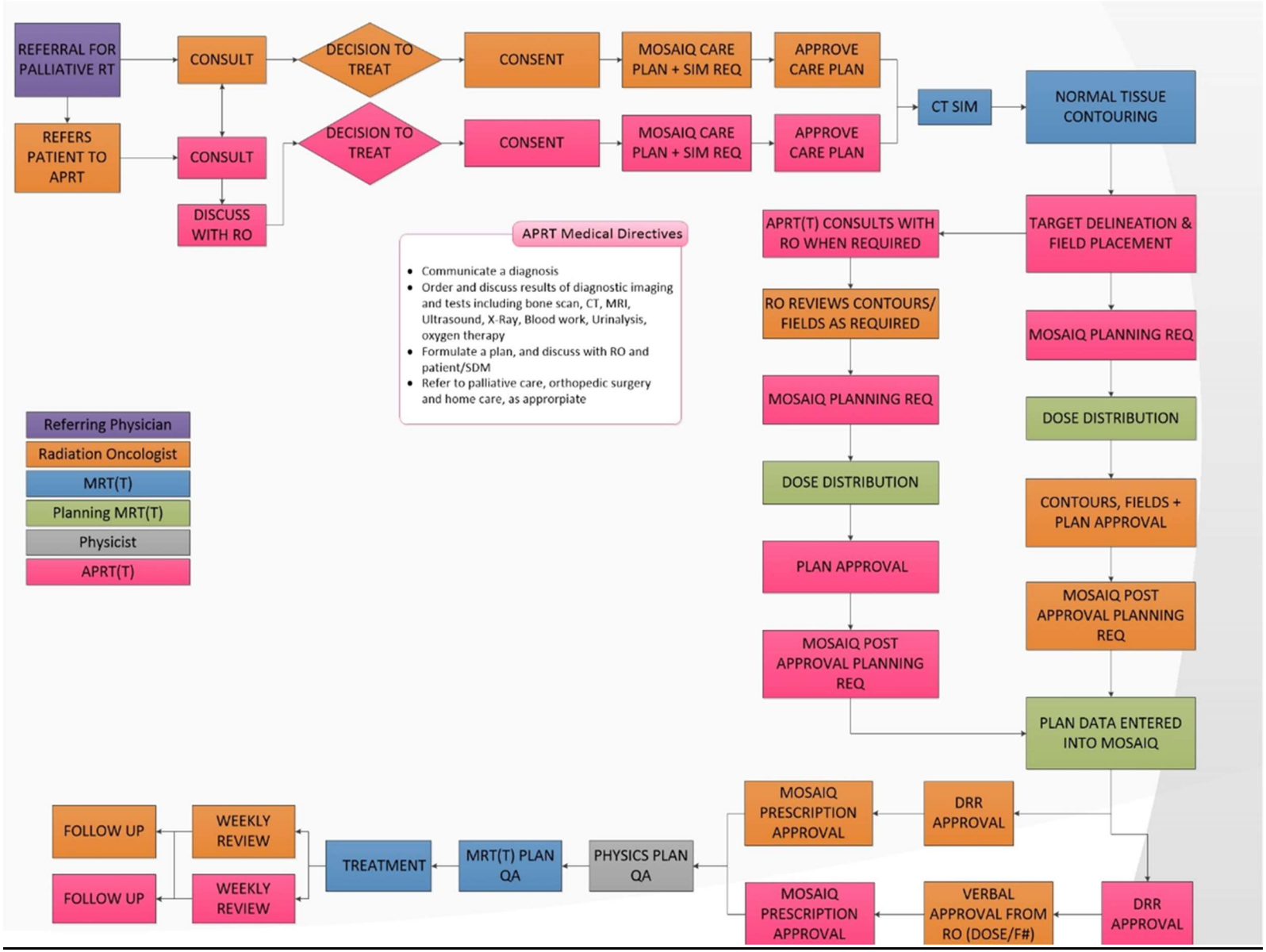
- Advanced knowledge of oncology, physics, radiobiology and anatomy
- Advanced technical knowledge of radiation treatment planning and delivery
- Expert clinical skills to perform responsibilities of role
- Critical thinking
- Problem solving
- Mentoring/coaching
- Team work skills
- Organizational/time management skills
- Interpersonal skills
- Communication skills
- Education delivery skills
- Research skills
- Conflict resolution
- Collaboration

Required Qualifications:

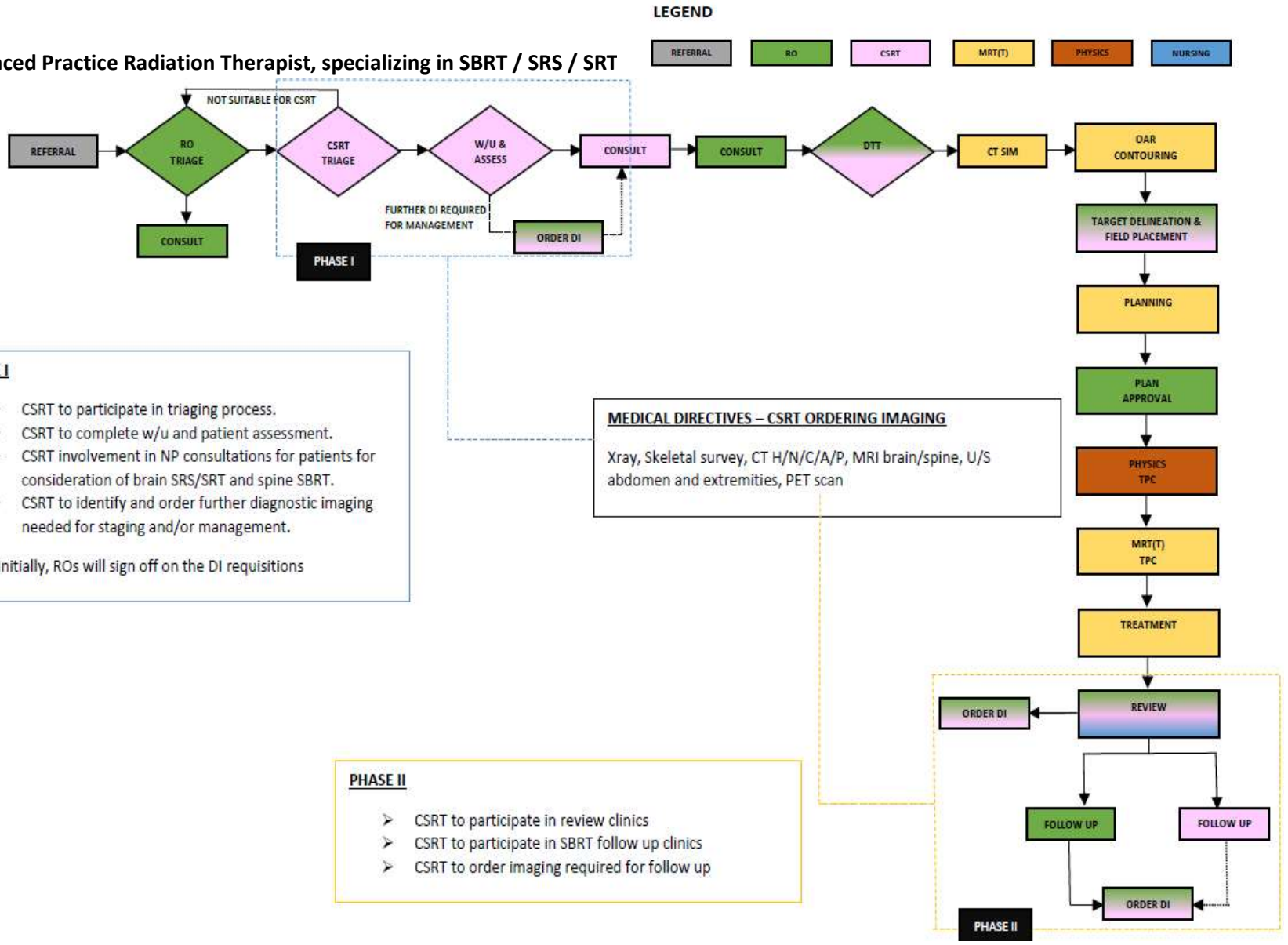
- Completion of a Bachelor's degree (Radiation Therapy)
- Graduate of accredited radiation therapy training program
- Current registration with CAMRT (or eligibility) to register as an APRT(T) designation (Advanced Practice Registered Technologist (Therapy)
- Master's degree in relevant field (or in pursuit of)
- Expert clinical skills to perform responsibilities of role
- 5 years practical experience as a radiation therapist
- Previous experience and expertise in patient assessment an asset
- Knowledgeable of performance measurement including the development of indicators and benchmarking
- Demonstrated ability to effectively lead a team
- Current Registration with CAMRT membership
- Advanced knowledge of oncology, physics, radiobiology and anatomy in area of defined patient population

Appendix E: Process Map Examples

Advanced Practice Radiation Therapist, specializing in palliative care



Advanced Practice Radiation Therapist, specializing in SBRT / SRS / SRT



Appendix F: A Toolkit for Defining the Current Model of Care, Identifying Problems and Improving Care

TORONTO JDMI

University of Toronto
Sinai Health System
University Health Network
Women's College Hospital

A Toolkit for Defining the Current Model of Care, Identifying Problems and Improving Care

Process Optimization in Medical Imaging – Exploring Advanced Roles for Medical Radiation Technologists

Appendix G: Competency Development Plan

Objectives (List your objectives for learning, developing skills etc.)

1. …
2. …
3. …

…..

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
1.				
2.				
3.				
….				

Timeline:

JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC

Example 1: APRT in Brachytherapy

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
1. Contour female pelvis ***1.1.*** *Learn female pelvis anatomy* *i Self study* *ii Tutorial with clinical supervisor/ delegates* ***1.2.*** *Contour tumor and OAR on CT/MRI* *i Self-study GEC-ESTRO guidelines* ii *Practice contouring*	Contour target: ● GTV/CTV ● Pelvic lymph nodes Contour OARs: ● Rectum ● Sigmoid ● Bladder	Train by MR-guided cervix group. Attend weekly Gynae Rounds	10 patients contoured and reviewed by Dr. XY	Anatomy Book (Perez) GEC-ESTRO guidelines PMH Protocols
2.				

Timeline:

JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1.1 Learn and practice contouring female pelvis		**1.2** Contour 10 patients				

Example 2: APRT in Palliative Care

Objectives (List your objectives for learning, developing skills, etc.):

1. Ensure all relevant information is available for clinical decision making.
2. Acquire advanced knowledge of the risks, benefits and indications for palliative radiation therapy.
3. Acquire advanced knowledge of diagnostic imaging modalities.
4. Acquire advanced knowledge and proficiency in performing a physical examination for bone metastases patients.
5. Acquire advanced knowledge and proficiency in performing a neurological examination for brain metastases patients.
6. Proficiency in contouring, target delineation and field placement for patients with bone metastases.
7. Proficiency in contouring, target delineation and field placement for patients with brain metastases.
8. Proficiency in determining suitable prescription dose and fractionation for bone and brain metastases patients.
9. Proficiency in the optimization of treatment plans for bone metastases.
10. Acquire advanced knowledge of medications.
11. Develop and conduct research.

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
1. Ensure all relevant information is available for clinical decision making. *1.1. Determine if information is complete to proceed with booking/assessing patient. (Status?)* *1.2. Prepare patient charts prior to consultations. (Status?)*	Consultation chart preparations for patients with brain metastases. Consultation chart preparations for patients with bone metastases.	Observe various ROs in clinics with a variety of different palliative cases. Review of sample cases with RO offline to discuss required clinical information in various scenarios. Observe radiation oncology nurses perform new patient chart preparation.	Evaluation of 5 brain metastases new patient charts preparations by RO Supervisor. Evaluation of 5 bone metastases new patient charts preparations by RO Supervisor.	DIRAC access

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
2. *Acquire advanced knowledge of the indications for, benefits and risks of palliative radiation therapy.* *2.1. Learn about the indications for palliative radiation therapy. (Status?)* *2.2. Learn about the benefits of palliative radiation therapy. (Status?)* *2.3. Learn about the risks associated with palliative radiation therapy (side effects, toxicities). (Status?)* *2.4. Communicate with patients regarding the indications for, benefits of and risks of radiation therapy. (Status?)* *2.4.1. Patients with brain metastases.* *2.4.2. Patients with bone metastases.*	Communicate with patients with bone metastases the indications for, benefits and risks of radiation. Communicate with patients with brain metastases the indication for, benefits and risks of radiation.	Train with the ROs on a palliative case-by-case basis. Observe ROs discussing indications for, benefits and risks of radiation with patients. Self-directed learning. Attend the "Learning Essentials Approaches to Palliative and End-of-Life Care" (LEAP) course.	Evaluation of 10 independent discussions with patients with bone metastases regarding the indications for, benefits and risks of radiation therapy. Evaluation of 10 independent discussions with patients with brain metastases regarding the indications for, benefits and risks of radiation therapy.	LEAP course
3. *Acquire advanced knowledge of diagnostic imaging modalities.*	Make recommendations as to which diagnostic tests for patients with bone	Shadow: - MRI technician	Make recommendations for imaging tests to the RO supervisor and determine if my recommendations are	Sectional Anatomy Text Books

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
3.1. Learn about the benefits and limitations to using the various imaging modalities and how to determine which is/are the most appropriate for a patient. (Status?) *3.2. Make recommendations for diagnostic imaging tests and determine if in concordance with RO. (Status?)* *3.2.1. Patients with brain metastases.* *3.2.2. Patients with bone metastases.*	metastases are most appropriate. Make recommendations as to which diagnostic tests for patients with brain metastases are most appropriate.	- Radiologist - Bone Scans Train with the ROs on a palliative case-by-case basis to decide on the most appropriate imaging modality when further diagnostic imaging is required. Self-directed learning.	in concordance with his decision.	IAMIOS online anatomy modules
4. Acquire advanced knowledge and skills in performing a physical examination for patients with bone metastases. *4.1. Learn the components of a comprehensive physical examination. (Status?)* *4.2. Observe ROs perform ten physical examinations for patients with bone metastases. (Status?)*	Perform a physical examination to evaluate the need for palliative radiation therapy for bone metastases. Identify and localize areas of pain or discomfort. Correlate areas of results with diagnostic imaging. Distinguish non-oncologic processes from the symptoms of bone metastases.	Learning from ROs in one-on-one tutorials. Observe physical examinations performed by the ROs. Perform physical examinations for patients with bone metastases under the supervision of the RO. Education sessions with CSRT in XXX and Radiation Oncologists.	10 independent physical examinations for patients with bone metastases completed under supervision and competence evaluated by the RO supervisor.	Physical Examination Books *- "Physical Examination and Health Assessment" (Jarvis)* *- Bates' Guide To Physical Examination And History-taking*

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
4.3. Practice supervised physical examinations for patients with bone metastases. (Status?)		Self-directed learning.		
5. Acquire advanced knowledge and skills in performing a neurological examination for brain metastases patients. *5.1. Learn the components of a comprehensive neurological examination. (Status?)* *5.2. Observe ROs perform ten neurological examinations for patients with brain metastases. (Status?)* *5.3. Practice supervised neurological examinations for patients with brain metastases. (Status?*	Perform a neurological examination to evaluate the need for palliative radiation therapy for brain metastases. Correlate results of neurological examination with diagnostic imaging. Distinguish non-oncologic processes from the symptoms of brain metastases.	Learning from ROs in one-on-one tutorials. Observe neurological examinations performed by the ROs. Perform neurological examinations for patients with brain metastases under the supervision of the RO. Education sessions with CSRT in XXX and Radiation Oncologists. Self-directed learning.	10 independent neurological examinations for patients with brain metastases completed under supervision and competence evaluated by the RO supervisor.	Physical Examination Books *- "Physical Examination and Health Assessment" (Jarvis)* *- Bates' Guide To Physical Examination And History-taking*
6. Proficiency in contouring, target delineation and field placement for patients with bone metastases. *6.1. Learn to identify and distinguish bone metastases on CT from other disease*	Delineate target volumes for patients with bone metastases. Delineate field borders for patients with bone metastases.	Train with the RO on a palliative case-by-case basis to identify and distinguish bone metastases on CT from other diseases and conditions.	Concordance study: Target delineation and field placement for patients with bone metastases.	Treatment Planning Books: *- Treatment Planning in Radiation Oncology (Khan)*

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
processes and conditions. (Status?) *6.2. Learn to identify and contour target volumes for patients with bone metastases. (Status?)* *6.3. Learn to place appropriate field borders for patients with bone metastases. (Status?)* *6.4. Practice contouring target volumes and placing treatment fields for patients with bone metastases with RO critique and assistance. (Status?)*		Observe contouring performed by the RO and discuss rationales for decision making. Compare lesions visible on CT with available diagnostic imaging and reports to confirm suspected bone metastases. Retrospectively examine contouring and fields done by the RO for patients with bone metastases. Contour target volume and place fields for patients with bone metastases with review by RO.		
7. Proficiency in contouring, target delineation and field placement for patients with brain metastases. *7.1. Learn to identify and distinguish brain metastases on CT from other disease processes and conditions. (Status?)* *7.2. Learn to identify and contour target volumes for patients*	Delineate target volumes for patients with brain metastases. Delineate field borders for patients with brain metastases.	Train with the RO on a palliative case-by-case basis to identify and distinguish brain metastases on CT from other diseases and conditions. Observe contouring performed by the RO and discuss rationales for decision making. Compare lesions visible on CT with available	Concordance study: Target delineation and field placement for patients with brain metastases.	Treatment Planning Books: - *Treatment Planning in Radiation Oncology (Khan)*

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
with brain metastases. (Status?) *7.3. Learn to place appropriate field borders for patients with brain metastases. (Status?)* *7.4. Contour target volumes and place treatment fields for patients with brain metastases with RO critique and assistance. (Status?)*		diagnostic imaging and reports to confirm suspected brain metastases. Retrospectively examine contouring and fields done by the RO for patients with brain metastases. Contour target volume and place fields for patients with brain metastases with review by RO.		
8. Proficiency in determining suitable prescription dose and fractionation for bone and brain metastases patients. *8.1. Learn the technical rationale for palliative radiation therapy prescriptions and when each is appropriate. (Status?)* *8.2. Learn the clinical rationale for palliative radiation therapy prescriptions and when each is appropriate. (Status?)* *8.3. Make recommendations for prescription dose and fractionation decisions and*	Make recommendations for radiation therapy prescriptions for patients with brain metastases. Make recommendations for radiation therapy prescriptions for patients with bone metastases.	Train with ROs on a palliative case-by-case basis to decide on an appropriate radiation therapy prescription. Retrospectively examine dose and fractionation decisions made by the RO for patients with bone and brain metastases. Attend Radiation oncology QA Rounds. Self-directed learning.	Concordance study: Radiation therapy prescriptions for palliative patients.	Up-to-date journal articles on palliative radiation prescriptions.

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
check for concordance with RO. (Status?)				
9. *Proficiency in the approval of optimized treatment plans for bone metastases.* *9.1. Learn the technical rationale for plan approvals for bone metastases. (Status?)* *9.2. Approve plans for bone metastases and check for concordance with RO. (Status?)*	Determine when to follow guidelines planning vs non-standard treatment planning. Approve an optimized treatment plan for patients with bone metastases. Consult with RO if treatment plan falls beyond CSRT scope of practice.	Shadow and participate in palliative planning with dosimetrists. Shadow and participate in palliative planning QA with physics. Train with ROs on a case-by-case basis on the approval of treatment plans for patients with bone metastases.	Concordance Study: Approval of optimized treatment plans for patients with bone metastases.	
10. *Acquire advanced knowledge of medications.* *10.1. Learn about the uses and contraindications for most commonly prescribed medications in palliative oncology for the management of radiation-induced side effects. (Status?)* *10.2. Learn about the uses and contraindications for the most commonly prescribed*	Make recommendations for prescriptions for radiation-induced side effects.	Self-directed learning. Attend the "Learning Essentials Approaches to Palliative and End-of-Life Care" (LEAP) course. Train with ROs on a case-by-case basis. Shadowing palliative care physicians and palliative care nurses.	When the RO feels I am able to consistently make recommendations that mirror his own prescriptions	LEAP course

Objectives	Will be able to perform	How I will get there	Evidence of successful completion	Resources Needed
medications in palliative oncology for the management of non-radiation-induced side effects (anxiety, depression, etc.). (Status?) *10.3. Observe the ROs making prescription decisions for palliative oncology patients. (Status?)* *10.4. Make recommendations for prescriptions for radiation-induced side effects and check for concordance with RO. (Status?)*		Education session with CSRT in XXX and Palliative Care Physician. Documentation and review of medications prescribed by RO of patients I see in clinic.		

	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1	***1.1*** *Determine what info is needed.*		***1.2*** *Prepare patient charts (5 brain metastases, 5 bone metastases)*									

	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
2	***2.1*** *Learn about the indications for palliative radiation therapy.* ***2.2*** *Learn about the benefits of palliative radiation therapy.* ***2.3*** *Learn about the risks associated with palliative radiation therapy.*								***2.4*** *Communicate with patients regarding the indications for, benefits of and risks of radiation therapy.*			
3	***3.1*** *Learn about imaging modalities.*			***3.2*** *Practice making recommendations for imaging tests.*								
4	***4.1*** *Learn about physical examinations for bone metastases.*		***4.2*** *Observe RO perform ten physical examinations for bone metastases.*			***4.3*** *Practice physical examinations for bone metastases patients.*						
5	***5.1*** *Learn about neurological examinations for brain metastases.*		***5.2*** *Observe RO perform ten neurological examinations for brain metastases.*			***5.3*** *Practice neurological examinations for brain metastases.*						
6	***6.1*** *Learn to identify bone metastases on CT images.*		***6.2*** *Learn to contour target volumes for bone metastases.* ***5.3*** *Learn to place fields for bone metastases.*		***6.4*** *Practice contouring target volumes and placing treatment fields for bone metastases.*							
7	***7.1*** *Learn to identify brain metastases on CT images.*		***7.2*** *Learn to contour target volumes for brain metastases.* ***7.3*** *Learn to place fields for brain metastases.*		***7.4*** *Practice contouring target volumes and placing treatment fields for brain metastases.*							

	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
8	***8.1*** *Learn the technical rationale for prescription dose and fractionation.* ***8.2*** *Learn the practical rationale for prescription dose and fractionation.*			***8.3*** *Practice making recommendations for prescription dose and fractionation for brain and bone metastases.*								
9	***9.1*** *Learn the technical rationale for plan approvals for bone metastases.*		***9.2*** *Practice approving plans for bone metastases.*									
10	***10.1*** *Learn about medications for radiation-induced side effects.* ***10.2*** *Learn about medications for non-radiation-induced side effects.* ***10.3*** *Observe ROs prescriptions*								***10.4*** *Make recommendations for prescriptions for radiation-induced side effects.*			
11	***11.0*** *Develop and conduct research.*											

Appendix H: Medical Directives

For reference, here is a list of the medical directives and delegations that have been previously used in Ontario, Canada:

Brachytherapy/Gyne:

- Imaging and assessing the quality of images
- Injection/administration of contrast media
- Administration of contrast media into the bladder
- Administration of saline into the bladder
- Insertion of brachytherapy applicator into the vagina for adjuvant vaginal vault high dose rate remote brachytherapy for endometrial carcinoma
- IV insertion/starts

Head and Neck:

- Head and Neck Clinical Specialist Radiation Therapist (CSRT) (Head and Neck CSRT) may approve normal structures in Head and Neck Radiotherapy plans without co-signature from a Radiation Oncologist.
- Head and Neck CSRT may approve electronic portal images and cone beam CT scans on Head and Neck cancer patients.
- Head and Neck CSRT may reinforce the details of a diagnosis to Head and Neck cancer patients.
- Head and Neck CSRT may order simulation for Head and Neck cancer patients without co-signature from a Radiation Oncologist.
- Head and Neck CSRT may order a Magnetic resonance imaging (MRI) of the head and neck for the purpose of radiation therapy planning (i.e. MRI Sim).
- Head and Neck CSRT may order a repeat computed tomography (CT) Simulation during Radiation Therapy without a co-signature from a Radiation Oncologist.
- Head and Neck CSRT may order a modified barium swallow for Head and Neck cancer patients.
- Head and Neck CSRT may make referral to speech language pathology for Head and Neck cancer patients.
- Head and Neck CSRT may make referral to dentistry for Head and Neck cancer patients.
- Head and Neck CSRT may refer Head and Neck cancer patients to a medical oncologist without a co-signature from a Radiation Oncologist.
- Head and Neck CSRT may make referral to audiology for Head and Neck cancer patients.

Palliative Care:

- The APRT will discuss with the Authorizing Prescriber the patient's physical assessment and the result of any diagnostic investigations obtained by the APRT for further management.

- The APRT will formulate and discuss the proposed plan of care options with the Authorizing Prescriber.
- Communicating to an individual or their personal representative a diagnosis identifying a disease or disorder as the cause of symptoms of the individual in circumstances in which it is reasonably foreseeable that the individual or their personal representative will rely on the diagnosis.
- The APRT will discuss results of diagnostic tests/imaging with a patient and their substitute decision maker (SDM).
- Communicating to the individual or their SDM a diagnosis identifying a disease or disorder as the cause of symptoms of the individual in circumstances in which it is reasonably foreseeable that the individual or their SDM will rely on the diagnosis
- Discuss and/or clarify an established cancer diagnosis with a patient/SDM.
- Communication of Results of Diagnostic Tests/Imaging with Patients
- Communicating to the individual or their SDM a diagnosis identifying a disease or disorder as the cause of symptoms of the individual in circumstances in which it is reasonably foreseeable that the individual or their SDM will rely on the diagnosis
- The APRT will obtain informed consent from the patient or their SDM to proceed with planning and delivery of radiation therapy.
- Obtaining Informed Consent for Radiation Treatment
- Approve Radiation Therapy Treatment Plans
- Discuss results of diagnostic tests/imaging with a patient/SDM.
- The APRT will discuss the patient's plan of care options with the patient, their family member/partner-in-care and their SDM to support informed decision-making.
- Discussion/Clarification of an Established Cancer Diagnosis
- Un-approve radiation prescriptions, care plans and radiation treatment plans for patients who do not fully complete a course of radiotherapy.
- While in collaborative practice with the attending Radiation Oncologist the Clinical Specialist Radiation Therapist (CSRT) can enter and approve orders in the electronic medical record system to initiate:
    - A new treatment planning CT by completing a new Treatment Planning Requisition Form
    - A replan from a current treatment planning CT (a re-target or a re-plan)
    - A change in the number of fractions
    - A delay in Radiation Therapy start date
    - A hold on Radiation Therapy Planning
    - A hold Radiation Therapy Treatment
    - A resumption of Radiation Therapy Planning
    - A resumption of Radiation Therapy Treatment
    - Cancellation of Radiation Therapy
- Order radiotherapy treatment be held or discontinued
- Order Planning/Dosimetry and Radiation Replanning
- Order Follow up appointments
- Order and approve Pre-Radiotherapy Patient Assessments

- The APRT will enter an Intent-to-Treat order for each new radiation therapy course in the electronic health record (EHR).
- Order simulations/Re-simulation
- The Clinical Specialist Radiation Therapist (CSRT) may enter/approve the treatment planning requisition (includes bulleted list below)
- Ordering imaging investigations
- The APRT will obtain a comprehensive health history and perform a physical assessment to determine current medical status and to subsequently select specific investigations and/ or treatment for patients outlined in this medical directive.
- The APRT(T) may implement the medical directive for initiating the order for a diagnostic test or intervention, and initiating consults for patients under the care of an attending physician at ____. The patient must be a registered outpatient or inpatient at _____.
- Ordering Appropriate Investigations
- Ordering imaging investigations
- The APRT(T) must implement this medical directive for initiating an order for medications in the table below according to the specified indications.
- Prescribing Medications
- In the radiation therapy health record (RTHR), the APRT will enter and approve known cancer diagnosis, radiation treatment planning requisitions, and radiation prescriptions as outlined in Table 3.
- Identify the course of radiation therapy, identify the intent of radiation therapy, Choose most appropriate care-plan from drop-down menu.
- Diagnoses, Radiation Prescriptions, Care Plans, Pacemaker Checks and Home Care
- Enter and approve a diagnosis, radiation prescription and care plan in Mosaiq
- The Clinical Specialist Radiation Therapist (CSRT) can complete: Standardized referral forms offering home and community support services as well as palliative care services within the community and within the Hospital.

Skin

- Skin CSRT may check the fit of beam modifying devices for skin cancer patients without a co-signature from a Radiation Oncologist
- Skin CSRT may dictate treatment notes under radiation treatment in Powerchart for Photodynamic Therapy and External Beam Radiation Therapy
- Skin CSRT may dictate clinic notes for follow-up clinics for Photodynamic Therapy
- Skin CSRT may deliver results of pathology reports to skin cancer patients with non-melanoma skin cancer
- Skin CSRT may complete consent to treatment for Photodynamic Therapy and External Beam Radiation Therapy for skin cancer without a co-signature from a Radiation Oncologist
- Skin CSRT may place electronic orders for follow-up appointments in Powerchart for skin cancer

- Skin CSRT may complete paper and electronic booking action forms on Powerchart for skin cancer
- Skin CSRT may order Methyl Aminolevulinate topical cream for treatment of basal cell carcinomas and actinic keratosis and squamous cell carcinoma in situ in Powerchart
- Skin CSRT may place electronic orders for referral to skin MDT clinic from Photodynamic Therapy clinic in Powerchart
- Skin CSRT may place electronic orders for surgical consult for neoadjuvant skin cancer cases from Photodynamic Therapy clinic in Powerchart