

An Advanced  
Practice Radiation  
Therapist Role  
Helps This  
Cancer Program

**Reach**

**New Heights:**

Improving  
Quality, Efficiency,  
Wellness, and  
Outcomes





The radiation therapy workforce, a cohort of highly skilled oncology personnel trained both technically and clinically, has experienced an increasingly robust role among the multidisciplinary radiation oncology team. Complex patient care needs and technological advancements have increased the radiation therapists (RTTs) scope of practice for decades. RTTs deliver daily therapeutic doses of radiation and thus provide care to patients more frequently than any other discipline within the daily operations of radiation oncology practice. These professionals are also uniquely positioned to have a significant impact on the quality of care provided.

In recent years, the Department of Radiation Oncology at the Mount Sinai Health System in New York, New York, encountered growing inefficiencies and challenges related to an increasing palliative inpatient population and complex inpatient workflows. This situation was made more complex by rising clinician burnout and the need for quality care improvements to meet the demands of value-based health care. The effort to implement new workflows for improving care and achieving cost savings resulted in a novel solution, which demanded a specific technical and clinical skill set. International

models had already demonstrated that improving the training, education, and intellectual capital of RTTs to an advanced practice level can address gaps in care and improve clinical and operational outcomes.<sup>1</sup> Among others, the United Kingdom and Canada have established models that increase efficiency, decrease costs, and retain skilled staff through the introduction of the role of an advanced practice radiation therapist (APRT).<sup>2-5</sup> In this article, Mount Sinai shares its experience from initial inception to implementation of the first APRT role in the United States to provide a better model of inpatient care, elevate the role of the radiation therapist, and improve quality, efficiency, wellness, and administrative outcomes.

### Current Drivers and Challenges

Modern health care delivery faces patient-related, technological, social, and financial challenges (Table 1). Perhaps the most critical of these challenges is the ever-increasing cost of health care. The Peter G. Peterson Foundation indicates that the US has the highest cost of health care in the world, climbing to nearly 20% of the gross

*Continued on page 13*

**Table 1. Health Care Delivery Drivers and Challenges**

DRIVERS	CHALLENGES
Technological	<ul style="list-style-type: none"> <li>• Artificial intelligence integration</li> <li>• Fast adoption speed of new technologies (MRI Linac, proton therapy)</li> </ul>
Patient Requirements	<ul style="list-style-type: none"> <li>• Oligometastatic state</li> <li>• Increasing complexity and subspecialization</li> </ul>
Financial	<ul style="list-style-type: none"> <li>• Reimbursement and resource reductions</li> <li>• Quality and efficiency in value-based care</li> </ul>
Social	<ul style="list-style-type: none"> <li>• Physician shortage and burnout</li> <li>• COVID-19 workforce impact</li> </ul>

APRT, advanced practice radiation therapist.

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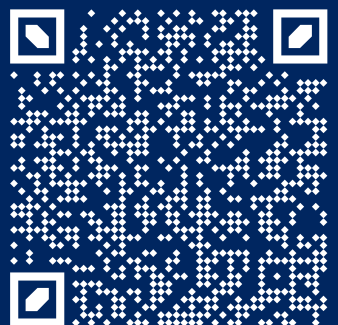


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domestic product.<sup>6</sup> Further, many manual and time-consuming health care delivery workflows are inefficient and outdated. Time is wasted on managing billing, insurance, and prior authorization processes, as well as allocating resources on inefficient processes. On the horizon, payer models will continue to change, particularly in radiation oncology, where the industry is preparing for more bundled payments and will be held accountable for reducing costs and improving efficiency with fewer resources.<sup>7</sup>

**An APRT is a RTT who, through training and education, possesses the knowledge, elevated skills, and judgment to provide a higher level of care within the radiation oncology department—impacting quality care and physician practice.<sup>5</sup>**

The COVID-19 pandemic has added stressors to health care delivery, particularly impacting the workforce. There are frontline health care worker shortages across the industry, and clinician—and staff—burnout is rapidly increasing.<sup>8</sup> Currently, nursing and physician burnout rates are at 55% and nonclinical staff at 47%.<sup>9</sup> Employee turnover in hospitals is at 20% and even higher in nursing homes.<sup>10</sup> Additional workforce shortages create ongoing care delivery challenges across provider specialties within oncology. Given these current obstacles, radiation oncology residency programs may struggle to fill their spots and the radiation therapy workforce already experiences a vacancy rate of 11%, as indicated for the fourth consecutive time in a national workplace survey conducted by the American Society of Radiologic Technologists.<sup>11,12</sup>

Meanwhile, new technologies are being adopted at an increasingly rapid rate. The integration and impact of artificial intelligence (AI) in health care is mostly unknown, even as new equipment and treatment approaches, such as proton therapy or adaptive technologies, such as (magnetic resonance imaging) MRI-Linac, equip the radiation oncology industry with new tools to create improved treatment options for patients. Optimizing these new technologies requires innovative care approaches that utilize the appropriate skill set of the right individual at the right time within the multidisciplinary team.

As cancer incidence in the US continues to increase, so does the complexity of care. Under the oligometastatic state (an intermediate stage of cancer between localized and widely spread disease), patients are living longer with their disease.<sup>12</sup> Approximately half of all cancer cases in the US are treated with radiation therapy.<sup>13</sup> A drive toward subspecialization affects the multidisciplinary team—not just physicians. Considering this growing demand, health systems have a responsibility to improve processes, increase efficiency, and reduce administrative waste while maintaining quality and improving the patient experience. The current state is not sustainable.

### Advanced Practice Radiation Therapy

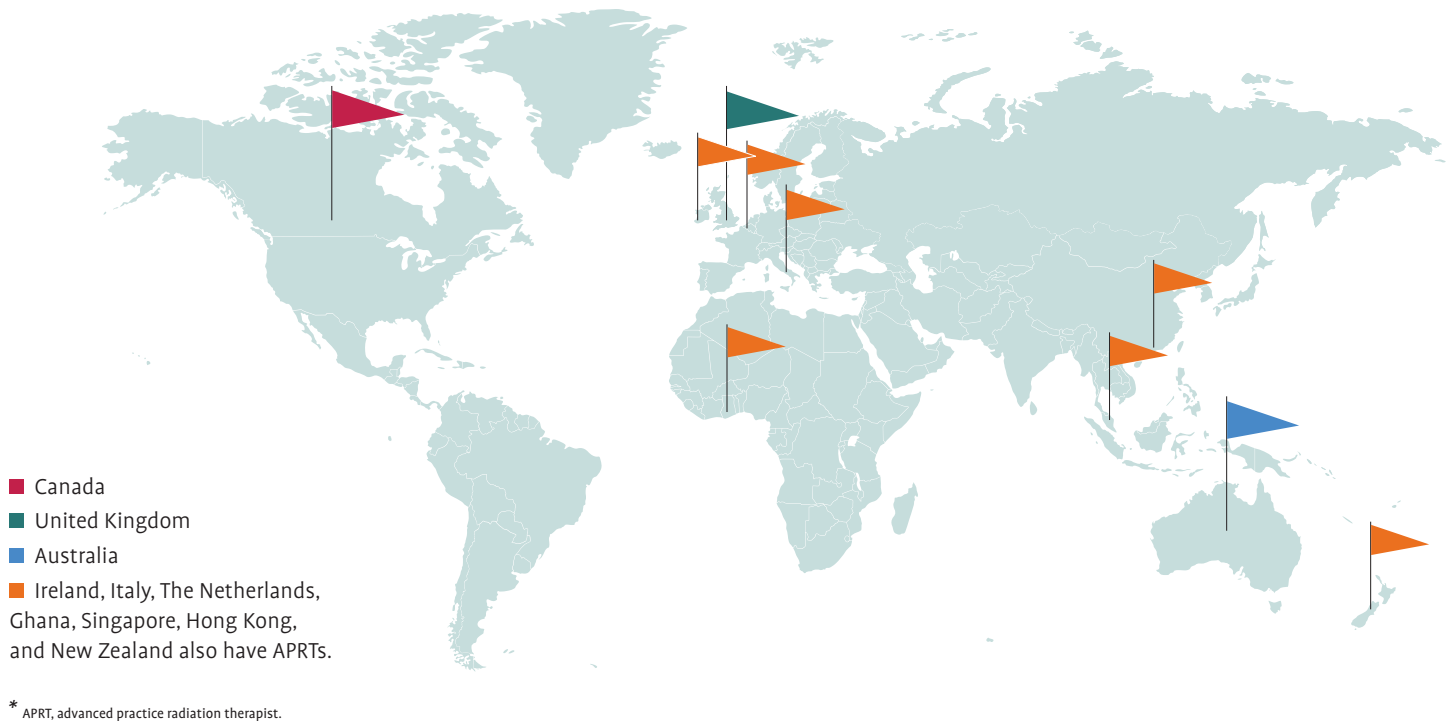
RTTs hold a distinct clinical and technical skill set that supports patients daily throughout their course of treatment. An APRT is a RTT who, through training and education, possesses the knowledge, elevated skills, and judgment to provide a higher level of care within the radiation oncology department—impacting quality care and physician practice.<sup>5</sup> International literature, rooted in evidence-based practice, demonstrates that elevating the existing skill set of RTTs through education and competency to provide interventions at key points along the radiation oncology care pathway can improve access, quality, and efficiency (Table 2).<sup>2,4</sup> The majority of research on APRT effectiveness originates from the UK (35%), Canada (31%), and Australia (18%) (Figure 1). Many studies address the feasibility of the APRT role, and show clinical practice outcomes, task congruence with other disciplines, and role evaluation and development. International care models are often site-specific or dedicated to a patient

**Table 2. International APRT Clinical and Operational Outcomes**

CLINICAL OUTCOMES	OPERATIONAL OUTCOMES
Enhanced patient care	Enhanced capacity and improved resource utilization
Streamlined palliative care	Improved quality
Improved treatment outcomes	Cost-effectiveness
Expedited and/or better access to care	Enhanced service development
Higher patient satisfaction and/or better patient experience	Increased knowledge dissemination

\* APRT, advanced practice radiation therapist.

Figure 1. Global Illustration of APRT\* Research and Publication Origin



population such as palliative, breast, brachytherapy, pediatrics, or head and neck.<sup>1</sup>

The European Society for Therapeutic Radiotherapy and Oncology (ESTRO) recognizes the APRT as “an advanced practitioner who works outside their standard of practice and demonstrates expert practice in a specialized area by autonomously taking on a leadership role in the development of radiotherapy services, and research associated with their specialty.”<sup>5</sup> Task shifting is often the mechanism to which this is done, or the rational redistribution of tasks among health care teams. Task shifting allows for service reconfiguration, enhancing physician practice, and most importantly, improving patient care within much needed patient cohorts such as the palliative inpatient population.<sup>3</sup>

Advancing the RTT profession in the US toward advanced practice has lagged compared with international counterparts. However, clinical and educational frameworks are being developed and a growing body of literature is being established. Figure 2 illustrates a timeline of current APRT initiatives in this country.

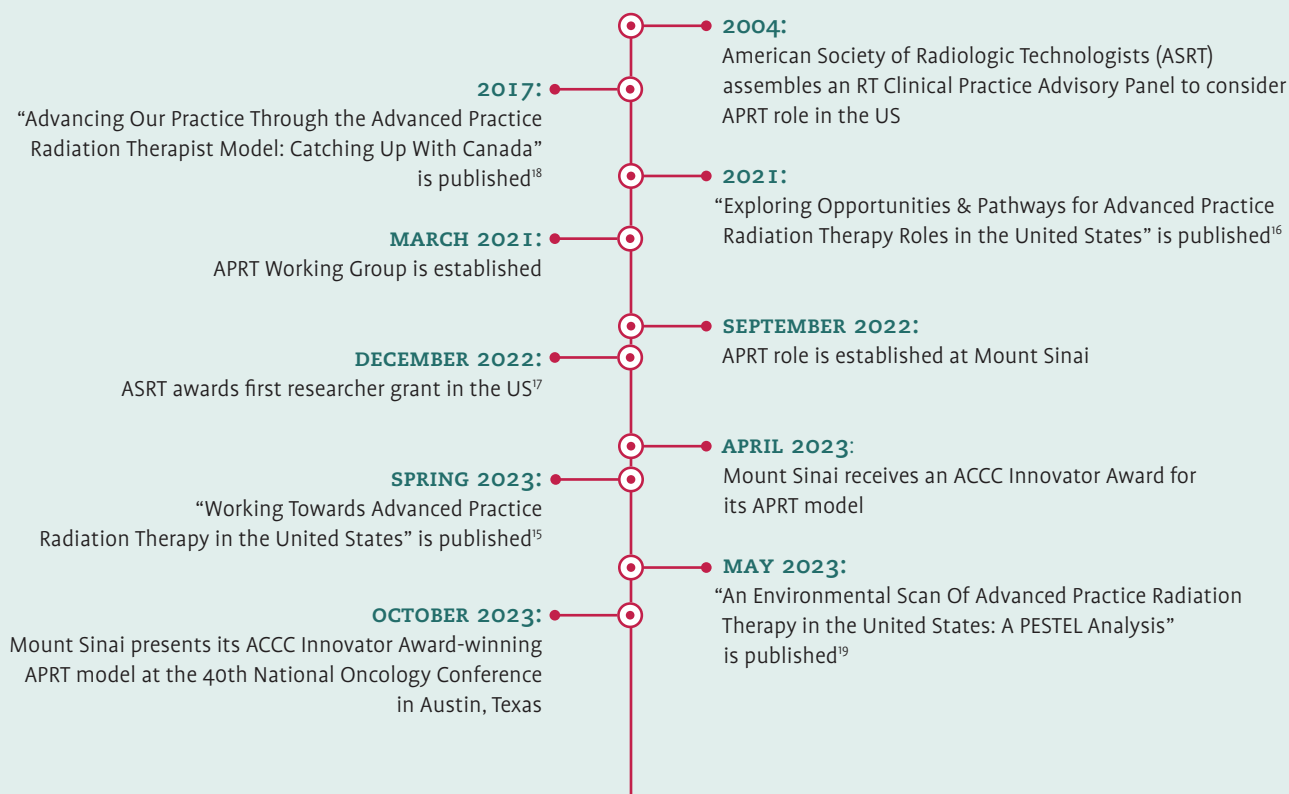
The Advanced Practice Radiation Therapy Working Group was established in 2021 and is a grassroots group of multidisciplinary radiation oncology professionals located across the nation, interested in studying and establishing the APRT role in the US.<sup>15</sup> Those participating recognize the value of the APRT in enhancing the quality and advancement of clinical care. The group seeks to establish an evidence-based consensus on the APRT role definition and determine the appropriate credentialing mechanism to support the uniform

implementation of advanced practice radiation therapy with a focus on improving patient outcomes and ensuring career progression and retention for radiation therapists in the field. In 2021, the US became part of the international APRT conversation through a publication in *TipsRO*.<sup>16</sup> The article outlines the opportunities under the current US health system infrastructure, noting challenges and a pathway for implementation through evidence-based practice.

In 2022, the radiation therapy team at the Mount Sinai Health System was awarded a research grant from the American Society of Radiologic Technologists (ASRT) Foundation to study the implementation of the APRT model in the US for the first time which represented a hallmark of their efforts.<sup>17</sup> In May of 2023, a collaborative publication from authors in the working group titled “An Environmental Scan of Advanced Practice Radiation Therapy in the United States: A PESTEL (Political, Economic, Sociological, Technological, Legal and Environmental) Analysis” was published in the *International Journal of Radiation Oncology–Biology–Physics*. The publication analyzes the current landscape under a PESTEL framework, identifying that as “patients enter different stages of their disease, the purpose of a new model is to provide individuals with the right care, at the right time, by the right team, in the right place. It is clear that the opportunity for positive change and impact on the current state of practice in radiation oncology exists.”<sup>19</sup>

While work is being done in the US to solidify a national model, much can be learned from international colleagues. The most well-established framework was developed by the National Health Service

**Figure 2. Timeline of APRT Milestones in the US**



ACCC, Association of Community Cancer Centers; APRT, advanced practice radiation therapist.

in the UK. The multiprofessional framework for advanced practice was developed for RTTs, diagnostic radiographers, and nurses that were practicing at a higher level.<sup>4</sup> This framework includes 4 pillars for effective advanced practice: clinical practice, leadership and management, education, and research.<sup>4</sup> Canadian colleagues and advisors encourage the US working group participants to study the implementation and effectiveness of advanced practice on evidence-based inquiries such as:<sup>2</sup>

- Could APRTs contribute to a new model of care that could add effectiveness and efficiency to the existing model of care?
- What works well and what does not within our existing model of care and what do we propose would work better?
- Where are our pain points and where could an APRT help?
- Does the new model save the system money, improve patient experience, and enhance outcomes and/or provider experiences?

When comparing the existing RTT skill set to the APRT skill set, one can envision elevating various duties to function at a higher level. For example, education, training, and competence can provide opportunities in areas such as patient assessment, treatment planning, treatment imaging and delivery, and education, among others (Table 3).

Until recently, there has been no path in the US for RTTs to advance

clinically beyond the senior or lead RTT position. This scenario is problematic as highly skilled staff may leave the field to advance their careers. Career progression opportunities, staff retention strategies, and the need to continuously advocate for the role of the RTT against encroachment further echo the need for APRTs in the US. Therefore, establishing a clinical advancement career pathway for the RTT provides a solution to enhance care, increase staff retention, and redesign existing models of care.

### The Mount Sinai Experience

Serving a high-volume, diverse patient population in New York, Mount Sinai Hospital’s Department of Radiation Oncology provides inpatient radiation services to a large cohort of patients annually. The radiation oncologists are assigned to the inpatient service on a rotational basis; depending upon multiple factors, these radiation oncologists may have several inpatient consultations that can take an increasing amount of time in their practice. Frequently, oncology patients may be referred for inpatient radiation treatment without a complete understanding of treatment complexities by the referring physicians. Patients and their families often require in-depth education regarding treatment and available options. Patient length of stay is often closely examined for acute care patients, with several complex care delivery challenges in

**Table 3. Examples of RTT and APRT Skills Comparison**

	RTT	APRT
<b>Patient assessment</b>	Monitors patients throughout treatment, recognizes patients' needs, and escalates for intervention.	Assesses patient ability to complete simulation and treatment, interviews patient for medical history, and analyzes and reports out findings to radiation oncologist to inform clinical decision-making.
<b>Treatment planning</b>	Checks treatment plan or calculation, compares images and makes adjustments, reviews discrepancies, and assists with action plan.	Performs calculation, reviews treatment plan with radiation oncologist to inform treatment process, reviews discrepancies and establishes action plan, contours OARs, and provides clinical mark-up.
<b>Treatment imaging and delivery</b>	Reviews images and makes shifts accordingly for radiation oncologist approval.	Provides initial image review and observations, performs initial isocenter placement for simulation, participates in adaptive treatment decision-making.
<b>Education</b>	Provides instruction to radiation therapy students and educates patients on treatment course, skin care, etc	Trains and mentors radiation therapy leadership, educates medical residents in area of expertise, conducts patient and family education.

APRT, advanced practice radiation therapist.

play, including socio-demographic issues, transportation access, and a lack of caregivers to assist the patient during their cancer care. Patients may be admitted longer than necessary due to a referral for radiation treatment. In some cases, providers may fear that if the patient is discharged, they will not return for the remainder of their required treatments, prolonging their length of stay.

Caring for patients with advanced cancer needing urgent, time-sensitive radiation therapy can exacerbate the stress on the multidisciplinary team. Determining if an inpatient will benefit from radiation

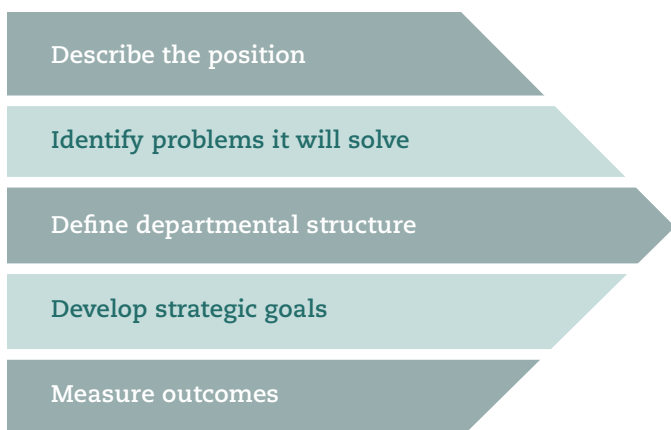
depends on their prognosis and on whether they complete the course of treatment.<sup>20</sup> Dependent upon the type of treatment, patients may have difficulty completing simulations and/or treatment due to appropriate workup, treatment complexity, comorbidities, pain, and other factors. Given these variables and in response to several near misses in the department, Mount Sinai Radiation Oncology recognized a need to identify a solution that would create a better model for the inpatient population that reduced the cost of care, improved the quality of care, and increased workflow efficiency for both the patients and the providers. A process mapping exercise on the existing model identified several gaps in care:

1. Better continuity of care at multiple stages in the inpatient process
2. The implementation of a new, safer inpatient workflow including daily inpatient orders from the frontline provider
3. Better communication and documentation between the inpatient providers and radiation oncology providers on the patient's plan of care
4. Quality improvement related to successful simulations and treatment courses.

In a unique position, the clinical manager and RTT in the department completed an international master's degree in advanced clinical practice, gaining the skills and knowledge of an advanced practitioner through mentorship from several radiation oncologists. With quality and clinical improvement projects in the department already underway, there was an enhanced focus on communication and a more personalized clinical approach for each patient through these efforts.

By following the UK's 4-pillar framework for advanced clinical

**Figure 3. APRT Role Development Framework**



APRT, advanced practice radiation therapist.

practice, and by leveraging the expertise of a dedicated group of multidisciplinary professionals in the department, leadership determined that an APRT position could provide an innovative solution. An APRT position description was drafted and incorporated into a comprehensive business model to navigate the justification and approval process internally. The APRT role development framework is illustrated in Figure 3. There were initially several ideas as to how to enhance the role of the RTT in the department. Ultimately the inpatient challenges presented as the greatest need and thus the APRT role would be specific to this patient population. To prevent role redundancy or encroachment issues, the position description and departmental structure were carefully designed to appropriately align with the departmental organization chart, taking into consideration the other disciplines in the department, including nursing, physics, RTTs, and medical residents. The overarching strategic goal was quality, safety, and value-based care. Finally, the group established several outcomes measures to be monitored and evaluated to improve the model. Outcomes from international literature helped define factors that influence the implementation of the role. Once in place, the clinical manager was promoted into the APRT position.

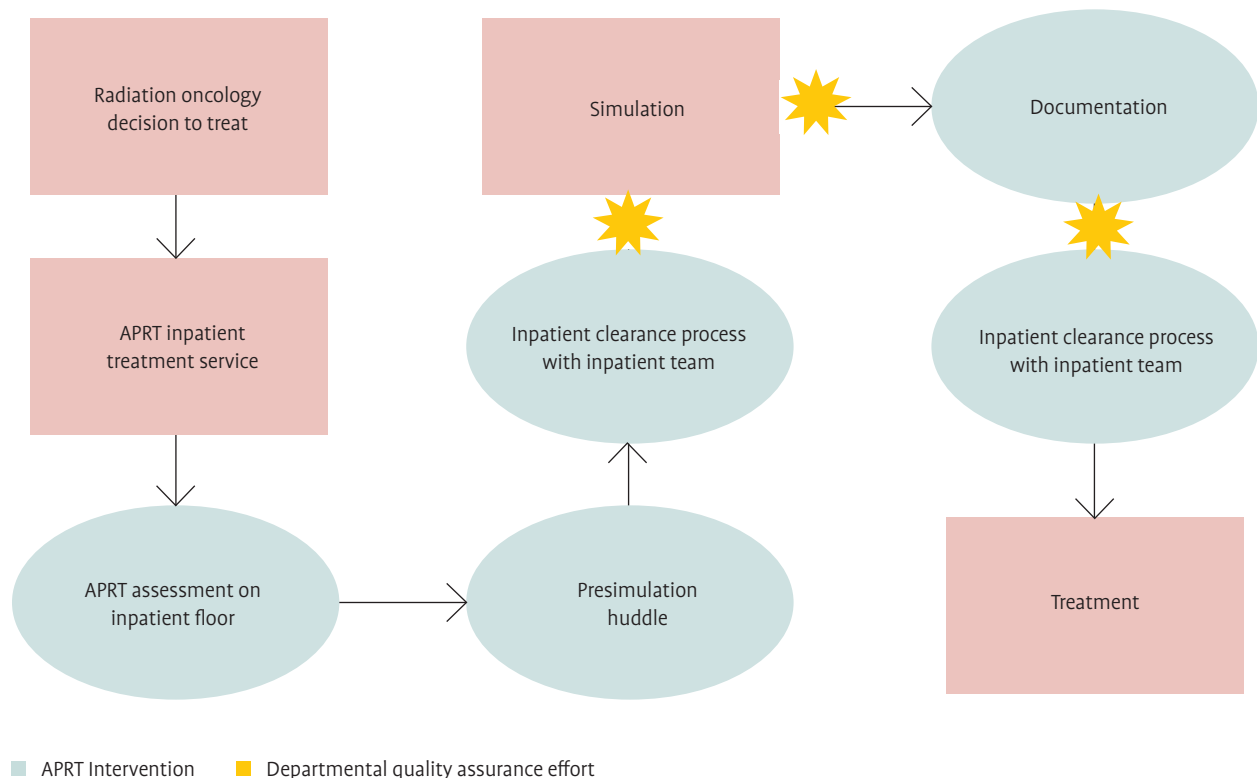
### Novel Outcomes

The APRT role established at Mount Sinai addresses an existing gap in care via an elevated radiation therapy skill set, increasing continuity of care through care coordination, concise quality measurements, grant funded research, and guided enhancements.

The APRT helps patients navigate each step of the inpatient process, as illustrated in Figure 4. From consult to follow-up, the APRT's clinical practice enhanced the existing care model for inpatients through radiation therapy specific care coordination and patient education, and by addressing the psychosocial needs of the patient. The APRT completes a pain and positioning evaluation, a radiation therapy specific patient assessment tool completed on the inpatient floor. This assessment tool serves as an intervention for inpatients at a point along the care pathway that had not been previously addressed. This assessment has led to a refined process and a better experience once patients reach the radiation oncology department. Further, there are fewer hand-offs among the team, which improves patient safety and optimizes care delivery.

Mount Sinai Radiation Oncology has earned 2 grants to study the effectiveness of the APRT model. An ASRT (American Society of Radiologic Technologists) Foundation grant is investigating cost reductions and time savings through the APRT intervention. Researchers

**Figure 4. Inpatient Radiation Treatment Service Workflow and the APRT's Involvement**



APRT, advanced practice radiation therapist.



**Table 4. Preliminary Outcomes Data After APRT Intervention\***

95% CI	PRE-APRT	POST-APRT
Proportion SN (scheduled but not simulated)	22.4% (16.9% - 28.6%)	17.4% (12.4% - 23.5%)
Proportion ST (simulated but not treated)	18.6% (13.6% - 24.5%)	10.8% (6.8% - 16.0%)

APRT, advanced practice radiation therapist.

\*CIs calculated with the Clopper-Pearson method. All numbers are exploratory. Groups will need to be matched using propensity score methods in next phase of analysis.


hypothesize the addition of the APRT role will reduce the number of times an inpatient is scheduled and not simulated and simulated but not treated. This scenario may be due to improper workup, communication, workflow barriers, and lack of coordination between the multidisciplinary clinicians involved prior to the APRT intervention. Through an exploratory summary of preliminary results, the new model seems to be making an impact by reducing both these metrics by 5% and 7.8% respectively (Table 4). Full results will be matched using propensity score methods in the next phase of analysis. Future publications and research will be available on this topic in 2024.

The APRT role not only helps physicians manage growing patient demands, but APRTs are able to take over lower-level tasks, including task-shifting to alleviate provider burnout. For example, APRTs often visit inpatient floors and relay key information to the physician. The physician wellness impact is being evaluated through a mini-Z survey along with several embedded questions regarding work with the APRT. This work is funded through an internal Mount Sinai grant from the Icahn School of Medicine Office of Well-Being and Resilience. Physicians are asked to respond to this question: “In the [past] 6 months did you have the opportunity to work with the APRT? If yes, what went well and what did not go well?” Preliminary results indicate that physicians returned positive responses in several key areas, including treatment, coordination, and patient care. Responses have indicated that the APRT “assisted in patient education, communication with the inpatient team, and streamlined the treatment process” and that the “[p]atient [is] more comfortable and aware of what to expect.”

The value and expertise of the APRT position has led to further positional exploration beyond inpatient care coordination, including a brachytherapy role (following international groundwork already established), enhancing and managing the use of new technologies, such as adaptive radiotherapy, and high-dose treatment management and coordination.

### The Path Forward

Innovation is necessary to improve care delivery in the US and decrease the rising costs. There are key drivers and associated

challenges that require individuals to think differently and devise novel solutions to common challenges. Physician burnout is growing at an increased rate, the status quo is not sustainable, and interventions are necessary to change the paradigm in modern medicine. Leadership must foster a culture of wellness by addressing staff well-being. By addressing these needs, and by creating opportunities for advancement, institutions may recruit and sustain highly skilled and talented staff. Mount Sinai Radiation Oncology leveraged the expertise of several key stakeholders and leadership to create an enhanced model of care for the inpatient radiation population. The department created a novel solution to a specific problem, allowing the radiation oncologists and RTTs to work at the top of their licenses. The new inpatient care delivery model focuses on continuity of care, safety, and departmental efficiency. Evidence-based research and experiences suggest that instituting substantial service improvements can pave the way for meaningful changes in the future of radiation therapy practice. The adoption of an APRT role depends on support from clinical management, administration, and physicians within individual departments. To ensure the APRT role is effective, managers must promote the possibility, RTTs should seek recognition and opportunities, and clinicians must become educated about its benefits. Pioneering the APRT role in the US will open new avenues for innovation and long-term value to patients and institutions. 

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