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QUALITY EDUCATION AND HEALTH SCIENCE FOR PATIENT BENEFIT

General Article

## *Synergy of Care: Inside the Radiotherapy Ecosystem*

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### **Exploring the Seven Pillars of Radiotherapy Excellence**

Radiotherapy represents far more than advanced machinery or clinical protocols; it is a dynamic and deeply human enterprise built on expertise, empathy, and coordinated effort. Each patient's experience unfolds through the commitment of professionals who bridge the divide between science and compassion, ensuring that every beam of radiation is guided not only by precision but also by care. In this write-up, we highlight seven foundational roles within the radiotherapy landscape, individuals whose collaboration transforms complex technology into meaningful treatment. From the oncologist's strategic clinical oversight to the physicist's meticulous dosimetric calculations, from the technologist's calming presence to the nurse's attentive vigilance, each professional contributes uniquely to a shared mission: to treat, to support, and ultimately, to restore.

#### **1. Radiation Oncologist — Architect of the Therapeutic Path:**

Central to the delivery of radiotherapy is the radiation oncologist, whose role extends beyond prescription to encompass the conceptualization and orchestration of individualized treatment strategies. Informed by a robust understanding of tumor histopathology, radiobiological response, and patient-specific variables, the radiation oncologist delineates treatment objectives—curative, palliative, or disease-stabilizing with precision. Treatment planning is conducted in accordance with internationally endorsed guidelines, including those from ESTRO, ASTRO, and the ICRU, ensuring adherence to best practices and consistency across clinical settings. Through multidisciplinary collaboration with medical physicists and radiation technologists, the oncologist ensures that therapeutic plans are both dosimetrically rigorous and contextually appropriate. From simulation to follow-up, their clinical stewardship integrates technical accuracy with an ongoing commitment to patient-centered care.

#### **2. Medical Physicist — The Mind of Precision, The Engineer Behind Every Beam:**

If the radiation oncologist determines the therapeutic objective, the medical physicist defines *how* that objective is realized—with rigor, safety, and scientific precision. Every treatment plan originates from their quantitative analyses, and every radiation beam depends on their meticulous calibrations. Employing advanced modalities such as 3D conformal radiotherapy (3DCRT), intensity-modulated radiotherapy

(IMRT), volumetric-modulated arc therapy (VMAT), image-guided radiotherapy (IGRT), simultaneous integrated boost (SIB), craniospinal irradiation (CSI), stereotactic radiosurgery (SRS), and stereotactic radiotherapy (SRT or SBRT), medical physicists sculpt radiation delivery to align with individual anatomical and dosimetric parameters. Their work is continuously benchmarked against international quality assurance frameworks, including those established by the International Atomic Energy Agency (IAEA) and the American Association of Physicists in Medicine (AAPM). Through systematic verification and daily quality control, they translate complex physical principles into consistent, reliable clinical practice quietly ensuring that technology remains a trustworthy extension of therapeutic intent.

### **3. Radiation Therapy Technologist (RTT) — Precision Meets Presence**

Often serving as the most familiar presence throughout the treatment course, the Radiation Therapist (RTT) translates complex planning into precise clinical execution. Operating sophisticated linear accelerators, RTTs ensure sub-millimetric patient alignment and verify positioning through real-time imaging and adaptive protocols. Their technical proficiency is indispensable to maintaining treatment accuracy and reproducibility. Yet, beyond the realm of precision and process, RTTs embody the human continuity of radiotherapy. They provide reassurance in moments of uncertainty, foster trust within the clinical environment, and transform technologically intensive procedures into experiences grounded in empathy and care. Each treatment session unfolds under their steady guidance, reflecting a seamless integration of technical mastery and patient-centered compassion.

### **4. Radiotherapy Nurse — The Human Touch in High-Tech Care**

From initial consultation through to post-treatment follow-up, the radiotherapy nurse constitutes a continuous and stabilizing presence within the care continuum. Their responsibilities encompass the proactive management of treatment-related toxicities, ongoing monitoring of physiological parameters, and the facilitation of communication between patients and the multidisciplinary care team. Beyond clinical duties, they play a pivotal role in patient education, psychosocial support, and advocacy—ensuring that individuals are not only medically safeguarded but also emotionally sustained throughout the radiotherapy process. In many respects, the radiotherapy nurse functions as the integrative thread that binds the technical, clinical, and human dimensions of oncologic care.

### **5. Patient Attendant — Foundational Support in the Therapeutic Encounter**

Long before the initiation of radiation delivery, a more immediate and often understated form of care takes place. Patient attendants serve as the first point of contact within the radiotherapy environment, facilitating physical transfers, providing orientation within clinical spaces, and guiding patients through unfamiliar procedural norms. Their presence, marked by consistency and attentiveness, restores a sense of dignity through small but deeply human interactions. Though their role may unfold largely in the background, the psychological and emotional reassurance they provide constitutes an essential component of the patient experience.

### **6. Biomedical Engineer — Custodian of Technological Integrity**

The precision of radiotherapy is fundamentally dependent on the reliability of its technological infrastructure. Biomedical engineers occupy a critical yet often invisible role in maintaining this integrity. Their responsibilities encompass the calibration, maintenance, and operational troubleshooting of key systems such as linear accelerators, imaging simulators, and ancillary equipment. Through proactive vigilance and adherence to safety protocols, biomedical engineers sustain treatment continuity and uphold technical accuracy—both of which are foundational to therapeutic efficacy.

## **7. Industry Vendor — Strategic Partner in Clinical Advancement**

Vendors in the radiotherapy domain extend far beyond the function of equipment provision. They serve as long-term collaborators, facilitating the integration of novel technologies, offering training and technical support, and ensuring the clinical team remains abreast of system updates and innovations. By maintaining a responsive interface between manufacturers and medical institutions, vendors contribute to operational sustainability while upholding ethical and regulatory standards. Their engagement is instrumental in enabling departments to evolve in step with the pace of scientific and technological progress.

### **Together, They Form the Radiotherapy Care Ecosystem**

While each role within the radiotherapy continuum carries its own domain of expertise, none operates in isolation. It is through interdependence—clinical, technical, and emotional—that a fully integrated care ecosystem emerges. Within this framework, precision is inseparable from compassion, and innovation is aligned with patient-centered values. Radiotherapy, then, is not merely the delivery of treatment; it becomes an orchestrated process of healing—sustained by trust, collaboration, and shared purpose.