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Opening the Black Box

Describing the work of medical physicists

by Kyle Schmanke, MS

Over the past couple of decades, the job of the radiation oncology physicist has evolved significantly and become increasingly complex. Twenty years ago, medical physicists were typically expected to handle every aspect of a hospital's radiation safety program, including diagnostic, nuclear medicine, and radiation therapy procedures. In short, the hospital's medical physicist was expected to be an expert at everything in the facility that was involved with radiation.

Times have changed. Over the past ten years, specialization in national certification boards and state licensure programs has led to four distinct branches of medical physics, and any overlap between these branches is rapidly decreasing. These four branches are:

- Health physics
- Diagnostic physics
- Nuclear medicine physics
- Radiation oncology physics.

Within these branches, further specialization is occurring. Consider radiation oncology physics, for example. Within this branch, stereotactic radiosurgery is a specific treatment modality that requires the medical physicist to have significant training and a specialized skill set. A physicist proficient and highly skilled on Gamma Knife® equipment and software could not be expected to transfer to a Cyberknife® facility and immediately be ready to assist physicians in patient treatments. The same holds true for high dose rate radiation (HDR), as well as treatment modalities delivered on the latest iterations of image-guided radiation therapy-enabled (IGRT) linear accelerators.

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Because of this specialization, the medical physicist's job description should be developed to reflect the specific equipment and procedures that are performed at the hospital or clinic at which he or she works. Medical staff and administration must also ensure that the physicist has the opportunity to have specific training on the equipment being deployed and utilized in the facility. In today's rapidly evolving high-tech environment, both software and hardware are frequently upgraded. Therefore, medical physicists must have access to vendor-specific training and continuing education to ensure operational proficiency and the safety of patients.

The medical physicist's clinical work and data are sometimes confined to a "Black Box" that may be considered too complicated to open or understand. Give physicists the support, time, and educational opportunities they need to make that box transparent so that everyone in the facility benefits with the patients' quality of care being continuously improved and validated by the radiation oncology team.

Kyle Schmanke, MS, is president of TMA Technology, Ltd., a nationwide provider of radiation oncology physics services and quality management tools, located in Grapevine, Tex.

Keep Current

Credentialing and accreditation are excellent ways to ensure that your facility's programs are in line with approved standards of care. Credentialing by the Radiation Therapy Oncology Group, (RTOG) ensures the highest standard of radiation therapy care is provided by the entire team of caregivers including the physician, physicist, dosimetrist, nursing, and therapist staff.

Peer review by a non-biased, outside physics group or a consulting physicist with particular expertise in the facility's equipment is essential to protect the program's staff and facility.

Peer review of a cancer center's radiation therapy physics program typically occurs on an annual basis. The peer review physicist examines the quality of the data used in the treatment planning computer, the process of treatment planning, and the individual patients' quality assurance. Also the chart review process and therapy equipment specific QA is closely examined to ensure it meets American Association of Physicists in Medicine, (AAPM) Task Group standards along with American College of Radiation Oncology, (ACRO) or American College of Radiology (ACR) Oncology Standards.

The American Association of Physicists in Medicine (AAPM) Task Group report on Radiation Oncology Physics peer review, TG-103 has excellent guidelines and sample reports for such a review.