SCOPE OF PRACTICE OF A MEDICAL DOSIMETRIST
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Preamble

The Scope of Practice of a Medical Dosimetrist is designed to assist the Qualified Medical Dosimetrist (QMD) in defining their role in the clinical and technical services they provide in patient care. This document defines a QMD, their basic responsibilities, and addresses the educational requirements, board certification, and maintenance of certification. Statements are included on supervision by and of the QMD. This document stresses the importance that the QMD is an active participant in the patient care team; and that effective communication with the radiation oncology team is essential for providing quality patient care and ensuring patient safety (1).

In addition, this Scope of Practice is intended to educate professionals in the fields of health care, education, other communities of interest, and the public regarding the expectations of a QMD (2). This document can be used by individual facilities to develop job descriptions and practice parameters.

The Scope of Practice defined in this document is meant to have some flexibility in interpretation and is not intended to be used to establish a legal standard of care (1). Professionals who use this document must be aware of state and federal laws affecting their practice as well as institutional policies and guidelines. The intent is not to supersede these laws or affect the interpretation or implementation of such laws.

The American Association of Medical Dosimetrists (AAMD) is an international society established to promote and support the Medical Dosimetry profession. The AAMD is committed to advancing the science, education, and professional practice of medical dosimetry. The AAMD periodically reviews and updates the professional practice guidelines for the QMD. This periodic review is done to continually reflect advances in clinical and technical services provided by the QMD towards improving the quality of dosimetric treatment planning in patient care. In addition, the AAMD provides opportunities for education, a forum for professional interaction and a representative voice in the healthcare community. The AAMD seeks to promote an ideal of professional conduct to which its members should aspire and endorses the highest standards of patient care (2).

I. Qualified Medical Dosimetrist

A Qualified Medical Dosimetrist is an individual who obtains the basic competency to practice in collaboration with a Radiation Oncologist (RO) and/or a Qualified Medical Physicist (QMP). The QMD is educated to independently perform duties and complete responsibilities under the direction of a RO and/or a QMP. The individual uses critical thinking and problem-solving skills as well as exercises their discretion and judgment in the performance of medical dosimetry procedures. It is expected that an individual will hold themselves qualified to practice in Medical Dosimetry when the knowledge and skills to perform dosimetric tasks has been established (3).

II. Professional Competence

Professional competence is the habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served (4).

III. Statement of Basic Responsibility

The essential responsibility of the QMD is to generate a clinically acceptable treatment plan. The treatment plan is created by utilizing clinical knowledge appropriately within the areas of anatomy, physiology, clinical oncology, radiobiology, radiation physics, radiation therapy, radiation safety and protection, mathematics, and technology. The QMD is expected to communicate with the RO during the treatment planning process to ensure prescribed planning directives are achieved effectively and participates in communicating the plan to the QMP and the Radiation Therapy Technologist (RTT) for quality assurance and implementation. The QMD utilize evidence-based practice standards to maximize efficacy while maintaining a high degree of accuracy, attention to detail, safety, and ethics. The QMD must use critical thinking skills when performing radiation treatment planning and plan evaluation, consequently recognizing and resolving clinical problems and treatment discrepancies (1,4).

IV. Definitions

The *Qualified Medical Dosimetrist (QMD)* is a member of the radiation oncology team who has knowledge of the overall characteristics and clinical relevance of radiation oncology in the management of cancer or other radio-responsive conditions with special expertise in radiation therapy treatment planning (1).

The *Practice of Medical Dosimetry* is performed by a health care professional designated as a Medical Dosimetrist and may include the process of patient data acquisition, radiation treatment planning for the administration of ionizing radiation, and quality management for radiation oncology patients. The QMD may have to ensure accurate transfer of patient information through several software programs, which may include record/ verify systems, surface guidance and/or image guided systems, treatment delivery systems, treatment planning systems, and treatment planning picture archiving and communication systems (PACS). In addition to the above, the QMD may perform or assist in other duties under the direction and/or supervision of the Board-Certified Radiation Oncologist (RO) and/or a Qualified Medical Physicist (QMP) (5).

A *Radiation Oncologist (RO)* is a board-certified Doctor of Medicine who is licensed to practice their medical specialty and who prescribes and/or utilizes radiological procedures for the diagnosis or treatment of individuals and their disease. The RO directs and utilizes the services of many interdisciplinary professions (1).

A *Qualified Medical Physicist (QMP)* is an individual who is competent to independently provide clinical professional services in one or more of the subfields of medical physics in which they are certified. A QMP must hold a professional medical physics license where required (5).

V. Specifics of Practice

This document summarizes the activities that the QMD can undertake based on the individual's training, qualifications, and demonstration of competence. Each QMD must exercise professional and prudential judgment in determining whether they are educationally prepared and clinically competent to perform a given activity. The QMD understands when to seek guidance and assistance with assigned activities.

The decision-making model described in ***Appendix 1***, provides rational and logical guidance to QMDs. When these guidelines are used to analyze whether a QMD may perform a task, the conclusion is reached that this act is or is not within the scope of practice of the individual QMD. QMDs should adhere to the *AAMD Code of Ethics* and the Medical Dosimetrist Certification Board (MDCB) *Ethical Standards and Ethics Complaint Procedures of the MDCB* (6,7)**.**

VI. Education and Certification

The AAMD recommends that individuals entering the field of medical dosimetry be prepared for this profession by earning the minimum of a baccalaureate degree and completing appropriate pre-requisite course work, completing a Medical Dosimetry educational program accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT), and obtaining certification by the MDCB (8). After obtaining MDCB certification, the QMD must adhere to the MDCB's Maintenance of Certification guidelines (9). The Certified Medical Dosimetrist (CMD) is recognized as the appropriate credential for the QMD.

VII. Continuing Education / Maintenance of Certification

Radiation oncology is a rapidly changing and technologically advancing field. Therefore, the QMD must maintain a level of expertise through both continuing education and training to adapt with the changes, and advancements within radiation oncology.

Maintenance of certification by the MDCB is part of the continuing education responsibilities of the QMD. Once certified, the QMD is personally and professionally accountable for the maintenance of certification according to the guidelines established by the MDCB (9).

The AAMD provides members with opportunities for continued education in accordance with the MDCB maintenance of certification (2).

VIII. Supervision

A QMD receives supervision from the RO, QMP, and senior/lead QMD.

A QMD may supervise other QMD and other allied health professionals.

IX. Collaboration and Communication

Collaboration and communication are essential to the process of patient data acquisition, radiation treatment planning, treatment plan evaluation, accurate treatment delivery, and quality management for radiation oncology patients. It is imperative that the QMD actively and openly collaborate and communicate with:

- RO, QMP, RTT, and other allied health personnel for radiation treatment planning, radiation dose delivery, and continuum of care in treatment delivery over the patient's treatment course.

- RO and QMP to ensure accurate radiation dose to each patient.

- QMP regarding quality assurance and quality management.

- QMP regarding radiation safety for patients, staff, and the public.

- Research and development scientist(s), RO, QMP, and equipment and software manufacturer(s) involved in the development and advancement of products and procedures designed for patient care including the trouble shooting of errors and malfunctions with equipment and software.

- Educators of graduate and residency programs in medical physics, medical residency programs in radiation oncology, medical dosimetry programs, radiation therapy programs, and other allied health programs to assist with the training and education of these individuals (10, 11, 12).

X. The Scope of Practice of the Qualified Medical Dosimetrist

Responsibilities of a QMD shall include, but are not limited to (1,4,12,13,14, 15):

- Acquisition of patient data via computer generated data sets from medical imaging devices such as CT, PET, MR, etc., or manual methods such as physical measurements and wire contours, and incorporation of this data into radiation treatment plans, calculations, and treatment devices.

- Assisting in image guidance.

- Assisting the RTT in the treatment simulation process.

- Provision of input for the use or necessity of ancillary treatment devices, patient immobilization techniques, and other patient positioning techniques as needed for simulation and treatment. May assist in fabrication of these ancillary treatment devices.

- Generation of isodose distributions and performance of optimization and dose calculations according to the RO written directive/orders.

- Incorporation of patient data from medical imaging procedures as the imaging data pertains to simulation, radiation treatment planning, treatment delivery and quality assurance.

- Acquisition of previous Digital Imaging and Communications in Medicine (DICOM) dose delivered and consideration of implications of reirradiation along with the RO and QMP.

- Contouring and delineating of clearly discernable normal critical structures using different imaging modalities through manual definition or application of supporting software tools, including automated artificial intelligence segmentation tools (with appropriate training).

- Creating relevant planning structures as directed by the RO and/or QMP.

- Registration and fusion (including image deformation) of multi-modality image sets or isodose distributions.

- Review with the RO the completeness of target and organ(s) at risk (OAR) delineation prior to treatment plan development and approval.

- Evaluation for accuracy of information generated for radiation treatment plans such as isodose distributions, Dose Volume Histograms (DVH's) and other data in establishing the clinical acceptance of the treatment plan.

- Application of knowledge of radiobiology with respect to dose tolerances, time dose fractionation calculations, hypo-fractionation, BED and EQD2 calculations and other applications of radiobiology to the radiation therapy treatment process.

- Accurate transfer and documentation of treatment parameters either manually or electronically according to departmental policies.

- Participation in accepted departmental, institutional, and national standards concerning the process of patient and treatment site identification.

- Participation in department huddles, chart rounds, peer reviews, etc. according to departmental and national guidelines.

- Application of principles and concepts of radiation physics in radiation treatment planning, which includes, but is not limited to, 2D, 3D conformal radiation therapy (3DCRT), intensity modulated radiation therapy (IMRT), 4D, proton or other charged particle therapy, volumetric modulated arc therapy (VMAT), real-time adaptive therapy, and brachytherapy.

- Accurate performance of dose calculations and subsequent secondary verification calculations, both manual and computer generated, for treatment delivery.

- Accurate performance of calculations pertaining to, but not limited to beam modifying devices, irregular fields, gaps for adjacent fields, and off-axis calculations.

- Participation in special treatment procedures including, but not limited to, Total Body Irradiation (TBI), Total Skin Electron Irradiation (TSEI), Intra-Operative Radiation Therapy (IORT), Stereotactic Radiosurgery (SRS), Stereotactic Body Radiation Therapy (SBRT), and other treatment procedures. Participation may include treatment planning of any special procedures. Involvement in any of these special treatment procedures requires completion of vendor based training or equivalent and credentialing by the institution to be able to practice medical dosimetry in these areas.

- Performance of / or assistance with quality assurance procedures as directed and/or supervised by a QMP.

- Performance of or assistance with the application of specific methods of radiation measurement including, but not limited to diodes, optically stimulated luminescent dosimeters (OSLD), ion chambers, thermo-luminescent dosimeters (TLD), or film measurements as directed and/or supervised by a QMP.
- In accordance with state and federal regulations / guidelines, under the supervision of the Authorized user, as defined by the Nuclear Regulatory Commission (NRC).

    - Having been appropriately trained and qualified in emergency procedures.
    - Participation in the preparation, measurement, transportation, loading and/or removal of radioisotopes.
    - Participation in low dose rate (LDR), pulsed dose rate (PDR), and high dose rate (HDR) procedures.

- Participation in brachytherapy treatment planning.

- Application of the principles of As Low As Reasonably Achievable (ALARA) to minimize exposure to patients, staff and the general public.

- Application of critical thinking skills during the simulation, radiation treatment planning, treatment evaluation, and treatment delivery processes.

- Participation in quality management in accordance with departmental and national guidelines.

- Performance of chart checks per departmental policy, being mindful that it is the responsibility of the medical physicist to perform weekly chart reviews.

- Participation in the implementation of the radiation treatment plan, which includes, but is not limited to, communication and collaboration with team members, plan documentation, treatment parameter verification and treatment charting.

- Participation in fiscal practices, such as billing, in accordance with departmental policies.

- Participation in clinical research for the development and implementation of new techniques in radiation therapy.

- Participation in the development and application of Artificial Intelligence (AI), Machine Learning, automation, and/or scripting programs in collaboration with the QMP.

- Participation in administrative duties when required.

- Participation in educational activities, instruction, training, etc. as required by departmental policies.

- Education of patients and their care providers regarding accurate explanations of treatment plan and instructions at an appropriate time and level of understanding.

- Practice of infection control per departmental guidelines.

- Adherence to high ethical and professional standards in relation to patients, students or trainees and colleagues.

- Non-discrimination of fellow colleagues regardless of age, gender, race, ethnicity, religion, disability, sexual orientation, gender identity, educational background, national origin, or any other distinguishing characteristics or traits.

Appendix 1

Decision Making

In addition to the *Scope and Standards of Medical Dosimetry Practice*, each QMD must exercise professional and prudent judgment in determining whether the performance of a given act is within the scope of practice for which the QMD is clinically competent to perform. The decision-making model, subsequently described, provides rational and logical guidance to QMDs. When these guidelines are used to analyze whether a QMD may perform a task, the conclusion is reached whether this act is appropriate within the scope of practice. *(See Figure 1)*

Decision Making Model for Determining the Scope of Practice of a Qualified Medical Dosimetrist

1. Describe the act being performed.

2. Does the act follow the basic parameters of legal practice? (e.g. regulations regarding the handling of radioactive materials)
    a. If the answer is NO, the act is not within your scope of practice.
    b. If the answer is YES or UNSURE, continue to the next step.

3. Does the act require you to have specialized medical dosimetry knowledge and skill?
    a. If the answer is NO, the act is not within your scope of practice.
    b. If the answer is YES, continue to the next step.

4. Is the act consistent with the scope of practice based upon at least this document or positive and conclusive data in the medical dosimetry, medical physics, or radiation oncology literature?
    a. If the answer is NO, the act is not within your scope of practice.
    b. If the answer is YES, continue to the next step.

5. Is there an appropriately established policy and procedure of the employing facility?
    a. If the answer is NO, the act is not within your scope of practice.
    b. If the answer is YES, continue to the next step.

6. Do you personally possess the depth and breadth of knowledge and clinical competency to perform the act safely and effectively?
    a. If the answer is NO, the act is not within your scope of practice.
    b. If the answer is YES, continue to the next step.

7. Do you personally possess current clinical competence to perform the act safely?
    a. If the answer is NO, the act is not within your scope of practice.
    b. If the answer is YES, continue to the next step.

8. Is the performance of the act within the accepted “standard of care” that would be provided in similar circumstances by reasonable and prudent medical dosimetrists who have similar training and experience?

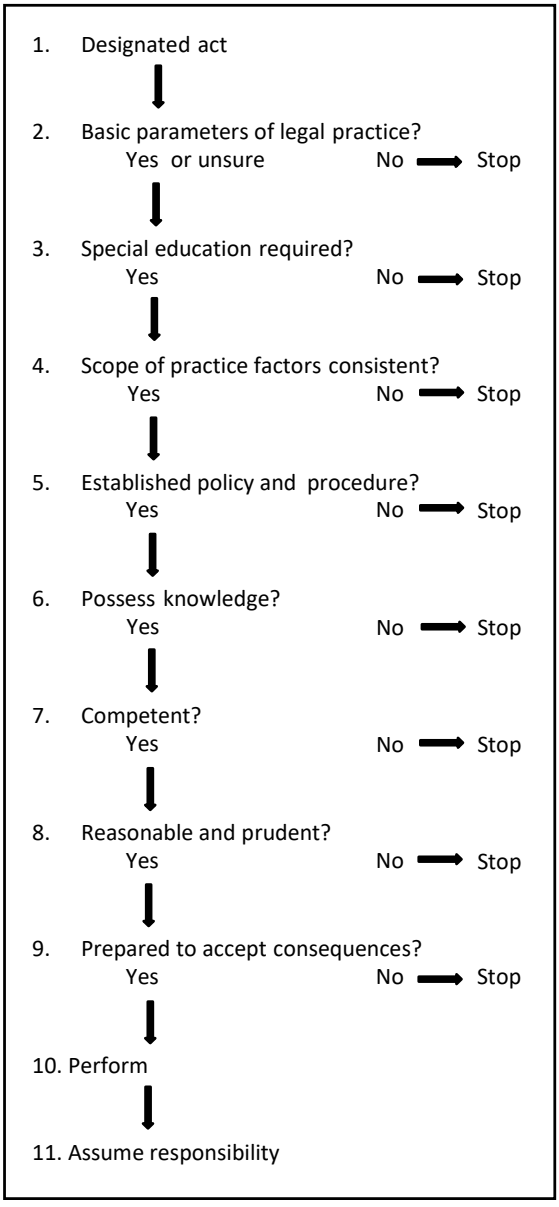
a. If the answer is NO, the act is not within your scope of practice.
b. If the answer is YES, continue to the next step.

9. Are you prepared to accept the consequences of your action?
    a. If the answer is NO, the act is not within your scope of practice.
    b. If the answer is YES, then:

10. Perform the act - based upon valid order when necessary, and in accordance with appropriately established policies and procedures.

11. Assume responsibility for your action(s).

Summary of Decision-Making Model



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