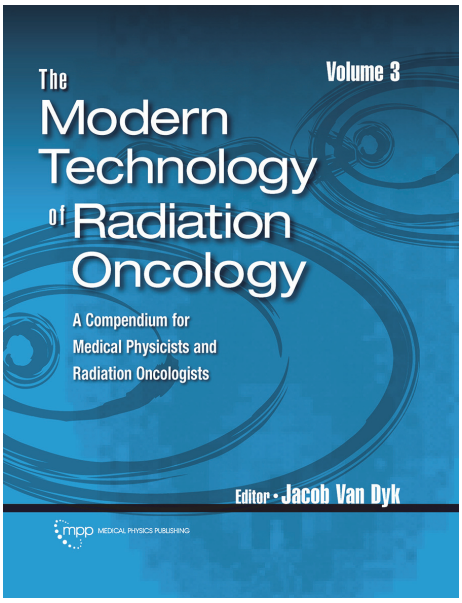

Chapter 16

Radiation Oncology Medical Physics Resources for Working, Teaching, and Learning

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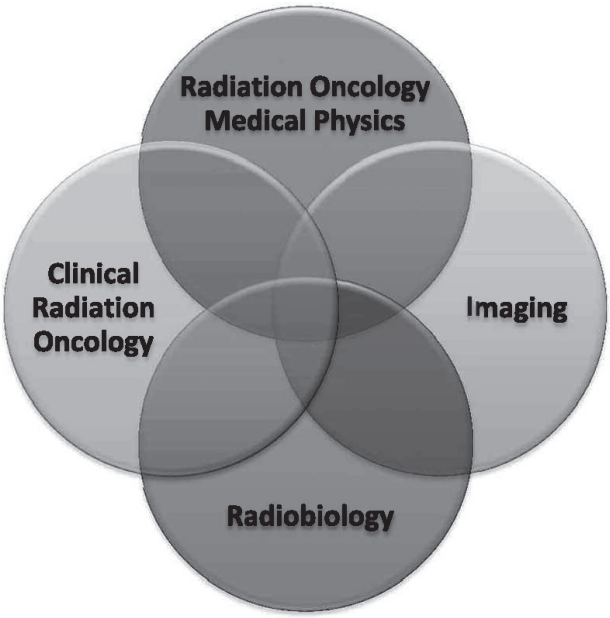
16.1 Introduction

Medical physics is the application of physics to medicine. Radiation oncology medical physics is a sub-discipline within medical physics that has a special application of medical physics in the context of radiation oncology. However, there are three other major sub-disciplines associated with radiation oncology medical physics as shown in the figure below. To practice their professional discipline, radiation oncology medical physicists need to have a clear understanding of relevant medical physics, in addition to components of clinical radiation oncology, radiobiology, and imaging. Furthermore, the other associated professionals—i.e., radiation oncologists, radiation therapists, and dosimetrists—need to have an appropriate knowledge of radiation oncology medical physics. While the Venn diagram below demonstrates overlapping sub-topics, the magnitude of these sub-topics is not to scale and, moreover, these are dynamic with time.

Twenty years ago, imaging was only a small component of a radiation oncology medical physicist's needed knowledge base, but there has been a tremendous growth in the use of computerized tomography (CT) both for treatment planning and image guidance, in addition to the more recent applications of imaging modalities such as magnetic resonance imaging (MRI), positron emission tomography (PET), single photon emission tomography (SPECT), and ultrasound (US). Additionally, with a greater use of dose-volume constraints for treatment planning, combined with the possibility of optimizing individual treatment plans based on radiobiological endpoints, a much greater knowledge of radiobiology is also required.

In terms of the working environment, the radiation oncology medical physicist is involved in all the technical and physics aspects associated with radiation treatment:

1. Physicists participate in the general design of radiation therapy facilities.
2. Physicists are major partners in the purchase and acquisition of radiation treatment and related equipment.



Schematic Venn diagram demonstrating the multidisciplinary nature of radiation oncology medical physics.

3. Physicists have a major responsibility for the accuracy and quality of the computerized treatment planning process.

4. Physicists develop and execute the quality assurance program, including the quality control of individual technologies associated with radiation treatment, as well as patient-specific treatment and dose verification.

5. Physicists are involved in all aspects of radiation safety, including the design of treatment and imaging rooms, licensing applications for nuclear regulatory agencies, staff monitoring of radiation exposures to personnel, development of an incident (error) reporting system, and addressing any radiation-related concerns for patients, the hospital staff, students, and the general public.

6. Physicists keep abreast of the developments in new technologies which are evolving at an enormously rapid rate and provide a leadership role in the implementation of new techniques and technologies as they become available to the clinic.

7. Physicists provide in-service education sessions for staff on topics related to treatment techniques, quality assurance programs, and radiation safety procedures.

8. For institutions having academic responsibilities associated with nearby universities, medical physicists may be involved in teaching radiation oncology medical residents, radiation therapists, medical physics residents, or medical physics students at the undergraduate and graduate levels. Furthermore, all medical physicists are involved in some sort of teaching, whether this be formal course lectures to students, in-service education, introductions to new techniques and technologies, or the necessary annual radiation safety lectures to professional staff.

9. Furthermore, academically oriented medical physicists may have significant research responsibilities.

The education and training required for radiation oncology medical physicists and the career structure of radiation oncology medical physicists in Canada has been described in detail by Van Dyk and Battista [2].

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16.3 Resources from National and International Organizations

16.3.1 American Association of Physicists in Medicine (AAPM) task group reports

The AAPM's task group reports can be found at http://www.aapm.org/pubs/reports/. The individual reports, primarily related to radiation oncology medical physics, are listed below by descending report number, which is largely reverse chronological order from most recent to earliest. Some reports may require AAPM membership for direct access.

Report No. 283: The report of Task Group 100 of the AAPM: Application of risk analysis methods to radiation therapy quality management. Medical Physics 43:4209–62, 2016. http://aapm.org/pubs/reports/RPT_283.pdf.

Report No. 271: Intracranial Stereotactic Positioning Systems: Report of the American Association of Physicists in Medicine Radiation Therapy Committee. Task Group No. 68. Medical Physics 32:2380–2398, 2005. http://aapm.org/pubs/reports/RPT_271.pdf.

Report No. 258: Monitor unit calculations for external photon and electron beams: Report of the AAPM Therapy Physics Committee Task Group No. 71. Medical Physics 41:3. http://aapm.org/pubs/reports/RPT_258.pdf.

Report No. 255: An introduction to molecular imaging in radiation oncology: A report by the AAPM Working Group on Molecular Imaging in Radiation Oncology (WGMIR) Medical Physics 40:10. http://aapm.org/pubs/reports/RPT_255.pdf.

Report No. 249: Essentials and Guidelines for Clinical Medical Physics Residency Training Programs. http://aapm.org/pubs/reports/RPT_249.pdf.

Report No. 229: Dose Calculation for Photon-Emitting Brachytherapy Sources with Average Energy Higher than 50 keV: Full Report of the AAPM and ESTRO. http://www.aapm.org/pubs/reports/RPT_229.pdf.

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Report No. 216: TG-69: Radiographic film for megavoltage beam dosimetry. Medical Physics, Vol. 34, Issue 6. http://www.aapm.org/pubs/reports/RPT_216.pdf.

Report No. 201: Information technology resource management in radiation oncology. http://www.aapm.org/pubs/reports/RPT_201Preliminary.pdf.

Report No. 197: Academic Program Recommendations for Graduate Degrees in Medical Physics. (This is a revision of Reports #44 and #79.) http://www.aapm.org/pubs/reports/RPT_197.pdf.

Report No. 197S: The Essential Medical Physics Didactic Elements for Physicists Entering the Profession through an Alternative Pathway: A Recommendation from the AAPM Working Group on the Revision of Reports 44 & 79. http://www.aapm.org/pubs/reports/RPT_197S.pdf.

Report No. 192: AAPM and GEC-ESTRO Guidelines for Image-guided Robotic Brachytherapy. Report of Task Group 192. Medical Physics, Volume 41, Issue 10. http://www.aapm.org/pubs/reports/RPT_192.pdf.

Report No. 186: Report of the Task Group 186 on model-based dose calculation methods in brachytherapy beyond the TG-43 formalism: Current status and recommendations for clinical implementation. Medical Physics, Vol. 39, Issue 10. http://www.aapm.org/pubs/reports/RPT_186.pdf.

Report No. 179: Quality assurance for image-guided radiation therapy utilizing CT-based technologies: A report of the AAPM TG-179. Medical Physics, Vol. 39, Issue 4. http://www.aapm.org/pubs/reports/RPT_179.pdf.

Report No. 176: Dosimetric effects caused by couch tops and immobilization devices: Report of AAPM Task Group 176. Medical Physics, Vol 41, Issue 6, 2014. http://aapm.org/pubs/reports/RPT_176.pdf.

Report No. 166: The Use and QA of Biologically Related Models for Treatment Planning—Full Report. http://www.aapm.org/pubs/reports/RPT_166.pdf.

Report No. 166: The use and QA of biologically related models for treatment planning: Short report of the TG-166 of the therapy physics committee of the AAPM—Short Report. Medical Physics, Vol. 39, Issue 3. http://www.aapm.org/pubs/reports/RPT_166ShortReport.pdf.

Report No. 160: Radiation Safety Officer Qualifications for Medical Facilities: Report of Task Group 160. http://www.aapm.org/pubs/reports/RPT_160.pdf.

Report No. 159: Recommended ethics curriculum for Medical Physics graduate and residency programs: Report of Task Group 159. http://www.aapm.org/pubs/reports/RPT_159.pdf.

Report No. 154: Quality assurance of U.S.-guided external beam radiotherapy for prostate cancer: Report of AAPM Task Group 154. Medical Physics, Vol. 38, Issue 2. http://www.aapm.org/pubs/reports/RPT_154.pdf.

Report No. 152: The 2007 AAPM response to the CRCPD request for recommendations for the CRCPD's model regulations for electronic brachytherapy. http://www.aapm.org/pubs/reports/RPT_152.pdf.

Report No. 149: Dose calculation formalisms and consensus dosimetry parameters for intravascular brachytherapy dosimetry: Recommendations of the AAPM Therapy Physics Committee Task Group No. 149. http://www.aapm.org/pubs/reports/RPT_149.pdf.

Report No. 148. QA for helical tomotherapy: Report of the AAPM Task Group 148. Medical Physics, Vol. 39, Issue 4. http://www.aapm.org/pubs/reports/RPT_148.pdf.

Report No. 142: Task Group 142 report: Quality assurance of medical accelerators. Medical Physics, Vol. 36, Issue 9. http://www.aapm.org/pubs/reports/RPT_142.pdf.

Report No. 128: Quality assurance tests for prostate brachytherapy ultrasound systems: Report of Task Group 128. Medical Physics, Vol. 35, Issue 12. http://www.aapm.org/pubs/reports/RPT_128.pdf.

Report No. 106: Accelerator beam data commissioning equipment and procedures: Report of the TG-106 of the Therapy Physics Committee of the AAPM. Medical Physics, Vol. 35, Issue 9. http://www.aapm.org/pubs/reports/RPT_106.pdf.

Report No. 105: Report of the AAPM Task Group No.105: Issues associated with clinical implementation of Monte Carlo-based photon and electron external beam treatment planning. Medical Physics, Vol. 34, Issue 12. http://www.aapm.org/pubs/reports/RPT_105.pdf.

Report No. 103: AAPM Task Group 103 report on peer review in clinical radiation oncology physics. Journal of Applied Clinical Medical Physics, Vol. 6, Issue 4. http://www.aapm.org/pubs/reports/RPT_103.pdf.

Report No. 99: Recommendations for clinical electron beam dosimetry: Supplement to the recommendations of Task Group 25. Medical Physics, Vol. 36, Issue 7. http://www.aapm.org/pubs/reports/RPT_99.pdf.

Report No. 98: Report of the AAPM Low Energy Brachytherapy Source Calibration Working Group: Third-party brachytherapy source calibrations and physicist responsibilities. Medical Physics, Vol. 35, Issue 9. http://www.aapm.org/pubs/reports/RPT_98.pdf.

Report No. 95: The management of imaging dose during image-guided radiotherapy: Report of the AAPM Task Group 75. Medical Physics, Vol. 34, Issue 10. http://www.aapm.org/pubs/reports/RPT_95.pdf.

Report No. 92: Intraoperative radiation therapy using mobile electron linear accelerators. http://www.aapm.org/pubs/reports/RPT_92.pdf.

Report No. 91: The Management of Respiratory Motion in Radiation Oncology. http://www.aapm.org/pubs/reports/RPT_91.pdf.

Report No. 89: Recommendations of the AAPM regarding the Impact of Implementing the 2004 Task Group 43. Report on Dose Specification for 103Pd and 125I Interstitial Brachytherapy. Medical Physics, Vol. 32, Issue 5. http://www.aapm.org/pubs/reports/RPT_89.pdf.

Report No. 88: Photodynamic Therapy Dosimetry. http://www.aapm.org/pubs/reports/RPT_88.pdf.

Report No. 87: Diode in Vivo Dosimetry for Patients Receiving External Beam Radiation Therapy. http://www.aapm.org/pubs/reports/RPT_87.pdf.

Report No. 86: Quality Assurance for Clinical Trials: A Primer for Physicists. http://www.aapm.org/pubs/reports/RPT_86.pdf.

Report No. 85: Tissue Inhomogeneity Corrections for Megavoltage Photon Beams. http://www.aapm.org/pubs/reports/RPT_85.pdf.

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Report No. 80: The Solo Practice of Medical Physics in Radiation Oncology. http://www.aapm.org/pubs/reports/RPT_80.pdf.

Report No. 76: AAPM Protocol for 40-300 kV X-ray Beam Dosimetry in Radiotherapy and Radiobiology. http://www.aapm.org/pubs/reports/RPT_76.pdf.

Report No. 75: Clinical Use of Electronic Portal Imaging. http://www.aapm.org/pubs/reports/RPT_75.pdf.

Report No. 72: Basic Applications of Multileaf Collimators. http://www.aapm.org/pubs/reports/RPT_72.pdf.

Report No. 71: A Primer for Radioimmunotherapy and Radionuclide Therapy. http://www.aapm.org/pubs/reports/RPT_71.pdf.

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Report No. 64: A Guide to the Teaching of Clinical Radiological Physics to Residents in Diagnostic and Therapeutic Radiology. http://www.aapm.org/pubs/reports/64/RPT_64.pdf.

Report No. 63: Radiochromic Film Dosimetry. Medical Physics, Vol. 25, Issue 11. http://www.aapm.org/pubs/reports/RPT_63.pdf.

Report No. 62: Quality Assurance for Clinical Radiotherapy Treatment Planning. Medical Physics, Vol. 25, Issue 10. http://www.aapm.org/pubs/reports/RPT_62.pdf.

Report No. 61: High Dose-Rate Brachytherapy Treatment Delivery. Medical Physics, Vol. 25, Issue 4. http://www.aapm.org/pubs/reports/RPT_61.pdf.

Report No. 59: Code of Practice for Brachytherapy Physics. Medical Physics, Vol. 24, Issue 10. http://www.aapm.org/pubs/reports/RPT_59.pdf.

Report No. 56: Medical Accelerator Safety Considerations. Medical Physics, Vol. 20, Issue 4. http://www.aapm.org/pubs/reports/RPT_56.pdf.

Report No. 55: Radiation Treatment Planning Dosimetry Verification. http://www.aapm.org/pubs/reports/RPT_55.pdf.

Report No. 54: Stereotactic Radiosurgery. http://www.aapm.org/pubs/reports/RPT_54.pdf.

Report No. 51: Dosimetry of Interstitial Brachytherapy Sources. Medical Physics, Vol. 22, Issue 2. http://www.aapm.org/pubs/reports/RPT_51.pdf.

Report No. 50: Fetal Dose from Radiotherapy with Photon Beams. Medical Physics, Vol. 22, Issue 1. http://www.aapm.org/pubs/reports/RPT_50.pdf.

Report No. 49: Dosimetry of Auger-Electron-Emitting Radionuclides. Medical Physics, Vol. 21, Issue 12. http://www.aapm.org/pubs/reports/RPT_49.pdf.

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Report No. 46: Comprehensive QA for Radiation Oncology. Medical Physics, Vol. 21, Issue 4. http://www.aapm.org/pubs/reports/RPT_46.pdf.

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Report No. 37: Auger Electron Dosimetry. Medical Physics, Vol. 19, Issue 6. http://www.aapm.org/pubs/reports/RPT_37.pdf.

Report No. 32: Clinical Electron-Beam Dosimetry. http://www.aapm.org/pubs/reports/rpt_32.pdf.

Report No. 27: Hyperthermia Treatment Planning. http://www.aapm.org/pubs/reports/rpt_27.pdf.

Report No. 26: Performance Evaluation of Hyperthermia Equipment. http://www.aapm.org/pubs/reports/rpt_26.pdf.

Report No. 24: Radiotherapy Portal Imaging Quality. http://www.aapm.org/pubs/reports/rpt_24.pdf.

Report No. 23: Total Skin Electron Therapy: Technique and Dosimetry. http://www.aapm.org/pubs/reports/rpt_23.pdf.

Report No. 21: Specification of Brachytherapy Source Strength. http://www.aapm.org/pubs/reports/rpt_21.pdf.

Report No. 19: Neutron Measurements Around High Energy X-Ray Radiotherapy Machines. http://www.aapm.org/pubs/reports/rpt_19.pdf.

Report No. 17: The Physical Aspects of Total and a Half Body Photon Irradiation. http://www.aapm.org/pubs/reports/rpt_17.pdf.

Report No. 16: Protocol for Heavy Charged-Particle Therapy Beam Dosimetry. http://www.aapm.org/pubs/reports/rpt_16.pdf.

Report No. 13: Physical Aspects of Quality Assurance in Radiation Therapy. http://www.aapm.org/pubs/reports/rpt_13.pdf.

Report No. 7: Protocol for Neutron Beam Dosimetry. http://www.aapm.org/pubs/reports/rpt_07.pdf.

Report OR-0: Information Transfer from Beam Data Acquisition Systems. http://www.aapm.org/pubs/reports/OR_01.pdf.

Report OR-02: A protocol for the determination of absorbed dose from high-energy photon and electron beams. http://www.aapm.org/pubs/reports/OR_02.pdf.

16.3.2 American Association of Physicists in Medicine (AAPM) practice guidelines

AAPM Medical Physics Practice Guideline 1.a.: CT protocol management and review practice guideline. Published in the Journal of Applied Clinical Medical Physics (JACMP). Vol 14, Number 5 (2013). ISBN: 978-1-936366-27-9. http://aapm.org/pubs/MPPG/documents/MPPG1a.pdf.

AAPM Medical Physics Practice Guideline 2.a: Commissioning and quality assurance of X-ray-based image-guided radiotherapy systems. Published in the Journal of Applied Clinical Medical Physics (JACMP). Vol 15, Number 1 (2014). ISBN: 978-1-936366-31-6. http://aapm.org/pubs/MPPG/documents/MPPG2a.pdf.

AAPM Medical Physics Practice Guideline 3.a: Levels of supervision for medical physicists in clinical training. Published in the Journal of Applied Clinical Medical Physics (JACMP). Vol 16, Number 3 (2015). ISBN: 978-1-936366-45-3. http://aapm.org/pubs/MPPG/documents/MPPG3a.pdf.

Medical Physics Practice Guideline 4.a: Development, implementation, use and maintenance of safety checklists. Published in the Journal of Applied Clinical Medical Physics (JACMP). Vol 16, Number 3 (2015). ISBN: 978-1-936366-46-0. http://aapm.org/pubs/MPPG/documents/MPPG4a.pdf.

AAPM Medical Physics Practice Guideline 5.a.: Commissioning and QA of Treatment Planning Dose Calculations–Megavoltage Photon and Electron Beams. Journal of Applied Clinical Medical Physics (JACMP). Vol 16, Number 5 (2015). http://www.jacmp.org/index.php/jacmp/article/view/5768.

16.3.3 American Association of Physicists in Medicine (AAPM) summer school proceedings

The AAPM Summer School proceedings are summarized below to as far back as 1990.

Principles and Practice of Proton Beam Therapy (2015 AAPM summer school). Indra J. Das and Harald Paganetti, editors. AAPM Medical Physics Monograph No. 37. Madison, WI: Medical Physics Publishing, 2015.

Sample on-line chapter, “Introduction and History of Proton Therapy” available at: https://www.medicalphysics.org/documents/AAPM_No37_Chapter1.pdf.

Quality and Safety in Radiotherapy: Learning the New Approaches in Task Group 100 and Beyond (2013 AAPM summer school). B. R. Thomadsen, P. Dunscombe, E. Ford, S. Huq, T. Pawlicki, and S. Sutlief, editors. AAPM Medical Physics Monograph No. 36. Madison, WI: Medical Physics Publishing, 2013.

Uncertainties in External Beam Radiation Therapy (2011 AAPM summer school). J. R. Palta and T. R. Mackie, editors. AAPM Medical Physics Monograph No. 35. Madison, WI: Medical Physics Publishing, 2011.

Clinical Dosimetry Measurements in Radiotherapy (2009 AAPM summer school). D. W. O. Rogers and J. E. Cygler, editors. Madison, WI: Medical Physics Publishing, 2011.

The Physics and Applications of PET/CT Imaging (AAPM 2008 summer school). D. Cody and O. Mawlawi, editors. Madison, WI: Medical Physics Publishing, 2008.

Integrating New Technologies into the Clinic: Monte Carlo and Image-Guided Radiation Therapy. (2006 AAPM summer school). AAPM Medical Physics Monograph No. 32. B. H. Curran, J. M. Balter, and I. J. Chetty, editors. Madison, WI: Medical Physics Publishing, 2006.

Sample on-line chapter, "Monte Carlo Non-Adaptive 4-D Treatment Planning in Conformal Radiation Therapy: Why, How, and What to Look For," available at: http://www.medicalphysics.org/documents/Rosu2.pdf.

Specifications, Performance Evaluations, and Quality Assurance of Radiographic and Fluoroscopic Systems in the Digital Era. (2004 AAPM summer school). AAPM Medical Physics Monograph No. 30. L. Goldman and M. Yester, editors. Madison, WI: Medical Physics Publishing, 2006.

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General Practice of Radiation Oncology Physics in the 21st Century. (2000 AAPM summer school). A. S. Shiu and D. E. Mellenberg, editors. AAPM Medical Physics Monograph No. 26. Madison, WI: Medical Physics Publishing, 2000.

Practical Digital Imaging and PACS (1999 AAPM summer school). AAPM Medical Physics Monograph No. 25. A. Seibert, L. Filipow, and K. P. Andriole, editors. Madison, WI: Medical Physics Publishing, 1999.

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The Physics of MRI. (1992 AAPM summer school). M. J. Bronskill and P. Sprawls. AAPM Medical Physics Monograph No. 21. (CD-ROM format). Madison, WI: Medical Physics Publishing, 2007.

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16.3.4 American College of Radiology–American Society for Radiation Oncology (ACR–ASTRO) practice guidelines

ACR Practice Parameter for Continuing Medical Education. American College of Radiology–American Society for Radiation Oncology (ACR/ASTRO), 2014. http://www.acr.org/Quality-Safety/Standards-Guidelines/Practice-Guidelines-by-Modality/Medical-Physics.

ACR–AAPM Practice Parameter on the Expert Witness in Medical Physics. American College of Radiology–American Society for Radiation Oncology (ACR/ASTRO), 2014. http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/Expert_Witness_Medical_Physics.pdf.

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ACR-ASTRO Practice Parameter for Radiation Oncology. American College of Radiology–American Society for Radiation Oncology (ACR/ASTRO), 2014. http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/Radiation_Oncology.pdf.

ACR–ASTRO Practice Guideline for the Performance of Proton Beam Radiation Therapy. American College of Radiology–American Society for Radiation Oncology (ACR/ASTRO), 2013. http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/Rad_Onc_Proton_Therapy.pdf.

ACR-ASTRO Practice Guideline for Intensity Modulated Radiation Therapy (IMRT). American College of Radiology–American Society for Radiation Oncology (ACR/ASTRO), 2011. http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/IMRT.pdf.

ACR-ASTRO Practice Guideline for 3-D External Beam Radiation Planning and Conformal Therapy. American College of Radiology–American Society for Radiation Oncology (ACR/ASTRO), 2011. http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/3D_External_Beam.pdf.

ACR-ASTRO Practice Guideline for the Performance of Stereotactic Radiosurgery. American College of Radiology–American Society for Radiation Oncology (ACR/ASTRO), 2011. http://www.acr.org/~/media/ACR/Documents/PGTS/guidelines/Stereotactic_Radiosurgery.pdf.

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Medical Linear Accelerators and Multileaf Collimators. (Feb. 2015)

Treatment Planning Systems. (Feb. 2015)

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Major Dosimetry Equipment. (Feb. 2015)

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Booklet 7 – Quality Assurance of Treatment Planning Systems – Practical Examples for Non-IMRT Photon Beams. B. Mijnheer, A. Olszewska, C. Fiorino, G. Hartmann, T. Knöös, J.-C. Rosenwald, and H. Welleweerd. Brussels, Belgium: European Society for Therapeutic Radiology and Oncology (ESTRO), 2004. http://www.estro.org/binaries/content/assets/estro/school/publications/booklet-7---quality-assurance-of-treatment-planning-systems---practical-examples-for-non-imrt-photon-beams.pdf.

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SSDL Network Charter. Vienna: International Atomic Energy Agency (IAEA), 1999.
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http://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---safework/documents/publication/wcms_152685.pdf.

Calibration of Dosimeters Used in Radiotherapy, Technical Report Series No. 374. Vienna: International Atomic Energy Agency (IAEA), 1994.

16.3.10 International Atomic Energy Agency (IAEA) training materials

Radiation Oncology Physics: A Handbook for Teachers and Students. E.B. Podgorsak, editor. PowerPoint slide sets for each of the 16 chapters. Vienna: International Atomic Energy Agency (IAEA), 2005. Slide set updated in 2007. http://www-naweb.iaea.org/NAHU/DMRP/slides.html.

Diagnostic and Interventional Radiology. 23-module PowerPoint slide set along with practicals. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/Radiology.htm.

Paediatric Radiology: Training material developed in collaboration with Image Gently. 10-module PowerPoint slide set. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/PaediatricRadiology.htm.

Radiation Protection in PET/CT. 12-lecture PowerPoint slide set. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/PETCT.htm.

Prevention of Accidental Exposures in Radiotherapy. 22-lecture PowerPoint slide set. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/AccidentPreventionRadiotherapy.htm.

Radiation Protection in Radiotherapy. 18-module PowerPoint slide set. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/Radiotherapy.htm.

Radiation Protection in Nuclear Medicine. 14-module PowerPoint slide set. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/NuclearMedicine.htm.

Radiation Protection in Cardiology. 14-lecture PowerPoint slide set. Vienna: International Atomic Ergy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/Cardiology.htm.

Radiation Protection in Digital Radiology. 10-module PowerPoint slide set. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/DigitalRadiology.htm.

Radiation Protection for Doctors Using Fluoroscopy Outside Radiology (Urologists, Gastroenterologists, Orthopaedic Surgeons, etc.). 9-module PowerPoint slide set. Vienna: International Atomic Energy Agency (IAEA). https://rpop.iaea.org/RPOP/RPoP/Content/AdditionalResources/Training/1_TrainingMaterial/Non-radiologistsNon-cardiologists.htm.

16.3.11 International Commission of Radiation Units and Measurements (ICRU) reports

The ICRU reports are now available on-line through the AAPM website (for AAPM members) at http://www.aapm.org/pubs/ICRU/?d=d.

Prescribing, Recording and Reporting Brachytherapy for Cervix Cancer Therapy. ICRU Report 89, Bethesda, MD: International Commission On Radiation Units and Measurements (ICRU), 2016.

Measurement and Reporting of Radon Exposures. ICRU 88. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 2016.

Radiation Dose and Image-Quality Assessment in Computed Tomography. ICRU Report 87. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 2012.

Quantification and Reporting of Low-Dose and Other Heterogeneous Exposures. ICRU Report 86. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 2011.

Fundamental Quantities and Units for Ionizing Radiation. ICRU Report 85. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 2011.

Prescribing, Recording, and Reporting Photon-Beam Intensity-Modulated Radiation Therapy (IMRT). ICRU Report 83. Bethesda, MD: International Commission On Radiation Units and Measurements (ICRU), 2010.

Prescribing, Recording, and Reporting Proton-Beam Therapy, ICRU Report 78. Washington D.C.: International Commission on Radiation Units and Measurements (ICRU), 2007.

Measurement Quality Assurance for Ionizing Radiation Dosimetry. ICRU Report 76. Journal of the ICRU 1–3 (2006).

Prescribing, Recording, and Reporting Electron Beam Therapy. ICRU Report 71. Bethesda, MD: International Commission On Radiation Units and Measurements (ICRU), 2004.

Image Quality in Chest Radiography. ICRU Report 70. Bethesda, MD: International Commission On Radiation Units and Measurements (ICRU), 2003.

Prescribing, Recording, and Reporting Photon Beam Therapy (Supplement to ICRU Report 50). ICRU Report 62. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1999.

Dose and Volume Specification for Reporting Interstital Therapy. ICRU Report 58. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1997.

Prescribing, recording, and reporting photon beam therapy. ICRU Report 50. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1993.

Phantoms and Computational Models in Therapy, Diagnosis and Protection. ICRU Report 48. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1992.

Tissue Substitutes in Radiation Dosimetry and Measurement. ICRU Report 44. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1989.

Use of Computers in External Beam Radiotherapy Procedures with High-Energy Photons and Electrons. ICRU Report 42. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1987.

Dose and Volume Specification for Reporting Intracavitary Therapy. ICRU Report 38. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1985.

Dose specification for reporting external beam therapy with photons and electrons. ICRU Report 29. Bethesda, MD: International Commission on Radiation Units and Measurements (ICRU), 1978.

Determination of Absorbed Dose in a Patient Irradiated by Beams of X or Gamma Rays in Radiotherapy Procedures. ICRU Report 24. Washington, D.C.: International Commission on Radiation Units and Measurements (ICRU), 1976.

16.3.12 International Commission on Radiological Protection reports

Radiological Protection from Cone Beam Computed Tomography (CBCT). ICRP Publication 129. Ann. ICRP 44(1), 2015.

Radiological Protection in Ion Beam Radiotherapy. ICRP Publication 127. Ann. ICRP 43(4), 2014.

Compendium of Dose Coefficients Based on ICRP Publication 60. ICRP Publication 119. International Commission on Radiological Protection (ICRP). Annals of the ICRP 41 (Suppl.) (2012).

ICRP Statement on Tissue Reactions/Early and Late Effects of Radiation in Normal Tissues and Organs – Threshold Doses for Tissue Reactions in a Radiation Protection Context, ICRP Publication 118. International Commission on Radiological Protection (ICRP), Annals of the ICRP 41 (2012).

Preventing Accidental Exposures from New External Beam Radiation Therapy Technologies, ICRP Publication 112. International Commission on Radiological Protection (ICRP). Annals of the ICRP 39 (2009).

Nuclear Decay Data for Dosimetric Calculations, ICRP Publication 107. International Commission on Radiological Protection (ICRP). Annals of the ICRP 38 (2008).

2007 Recommendations of the International Commission on Radiological Protection (Users Edition), ICRP Publication 103 (Users Edition). International Commission on Radiological Protection (ICRP). Annals of the ICRP 37 (2007).

Assessing Dose of the Representative Person for the Purpose of the Radiation Protection of the Public, ICRP Publication 101a. International Commission on Radiological Protection (ICRP). Annals of the ICRP 36 (2006)

Radiation Safety Aspects of Brachytherapy for Prostate Cancer Using Permanently Implanted Sources, ICRP Publication 98. International Commission on Radiological Protection (ICRP). Annals of the ICRP 35 (2005).

Prevention of High-Dose-Rate Brachytherapy Accidents, ICRP Publication 97. International Commission on Radiological Protection (ICRP). Annals of the ICRP 35 (2005).

Release of Patients after Therapy with Unsealed Radionuclides, ICRP Publication 94. International Commission on Radiological Protection (ICRP). Annals of the ICRP 34 (2004).

Relative Biological Effectiveness, Radiation Weighting and Quality Factor, ICRP Publication 92. International Commission on Radiological Protection (ICRP). Annals of the ICRP 33 (2003).

Prevention of Accidental Exposures to Patients Undergoing Radiation Therapy, ICRP Publication 86. International Commission on Radiological Protection (ICRP). Annals of the ICRP 30 (2000).

16.3.13 Italian Association of Medical Physicists/Associazione Italiana di Fisica Medica (AIFM)

Intensity Modulated Radiation Therapy (IMRT): Dosimetric and Computational Aspects. AIFM Report No. 3, 2006. http://www.fisicamedica.it/aifm/report/2006_n3_ReportAIFM.pdf.

16.3.14 National Committee on Radiation Protection (NCRP) reports

The following is a listing of relevant reports from the U.S. National Committee of Radiation Protection (NCRP) since 1980. All NCRP reports since 1971 are now available on-line through the AAPM website (for AAPM members) at http://www.aapm.org/pubs/NCRP/.

Report No. 174. Preconception and Prenatal Radiation Exposure: Health Effects and Protective Guidance. Bethesda, MD: NCRP Publications, 2013.

NCRP Report No. 173. Investigation of Radiological Incidents. Bethesda, MD: NCRP Publications, 2012.

NCRP Report No. 172 – Reference Levels and Achievable Doses in Medical and Dental Imaging: Recommendations for the United States. Bethesda, MD: NCRP Publications, 2012.

NCRP Report No. 171 – Uncertainties in the Estimation of Radiation Risks and Probability of Disease Causation. Bethesda, MD: NCRP Publications, 2012.

NCRP Report No. 170 – Second Primary Cancers and Cardiovascular Disease After Radiation Therapy. Bethesda, MD: NCRP Publications, 2011.

NCRP Report No. 164 – Uncertainties in Internal Radiation Dose Assessment. Bethesda, MD: NCRP Publications, 2009.

NCRP Report No. 163 – Radiation Dose Reconstruction: Principles and Practices. Bethesda, MD: NCRP Publications, 2009.

NCRP Report No. 162 – Self Assessment of Radiation-Safety Programs. Bethesda, MD: NCRP Publications, 2009.

NCRP Report No. 161. II – Management of Persons Contaminated With Radionuclides: Scientific and Technical Bases. Bethesda, MD: NCRP Publications, 2008.

NCRP Report No. 161. I – Management of Persons Contaminated With Radionuclides: Handbook. Bethesda, MD: NCRP Publications, 2008.

NCRP Report No. 160 – Ionizing Radiation Exposure of the Population of the United States. Bethesda, MD: NCRP Publications, 2009.

NCRP Report No. 159 – Risk to the Thyroid from Ionizing Radiation. Bethesda, MD: NCRP Publications, 2008.

NCRP Report No. 158 – Uncertainties in the Measurement and Dosimetry of External Radiation. Bethesda, MD: NCRP Publications, 2007.

NCRP Report No. 157 – Radiation Protection in Educational Institutions. Bethesda, MD: NCRP Publications, 2007.

NCRP Report No. 155 – Management of Radionuclide Therapy Patients. Bethesda, MD: NCRP Publications, 2006.

NCRP Report No. 151 – Structural Shielding Design and Evaluation for Megavoltage x-Ray and Gamma-Ray Radiotherapy Facilities. Bethesda, MD: NCRP Publications, 2005.

NCRP Report No. 149 – A Guide to Mammography and Other Breast Imaging Procedures. Bethesda, MD: NCRP Publications, 2004.

NCRP Report No. 147. Structural Shielding Design for Medical X-Ray Imaging Facilities. Bethesda, MD: NCRP Publications, 2004.

NCRP Report No. 144. Radiation Protection for Particle Accelerator Facilities. Bethesda, MD: NCRP Publications, 2003.

NCRP Report No. 140 – Exposure Criteria for Medical Diagnostic Ultrasound. Bethesda, MD: NCRP Publications, 2002.

NCRP Report No. 136 – Evaluation of the Linear-Nonthreshold Dose-Response Model for Ionizing Radiation. Bethesda, MD: NCRP Publications, 2001.

NCRP Report No. 134 – Operational Radiation Safety Training. Bethesda, MD: NCRP Publications, 2000. NCRP.

Report No. 128 – Radionuclide Exposure of the Embryo/Fetus. Bethesda, MD: NCRP Publications, 1998. NCRP

Report No. 127 – Operational Radiation Safety Program. Bethesda, MD: NCRP Publications, 1998.

NCRP Report No. 126 – Uncertainties in Fatal Cancer Risk Estimates Used in Radiation Protection. Bethesda, MD: NCRP Publications, 1997.

NCRP Report No. 124 – Sources and Magnitude of Occupational and Public Exposures from Nuclear Medicine Procedures. Bethesda, MD: NCRP Publications, 1996.

NCRP Report No. 122 – Use of Personal Monitors to Estimate Effective Dose Equivalent and Effective Dose to Workers For External Exposure to Low-LET Radiation. Bethesda, MD: NCRP Publications, 1995.

NCRP Report No. 117 – Research Needs for Radiation Protection. Bethesda, MD: NCRP Publications, 1993.

NCRP Report No. 116 – Limitation of Exposure to Ionizing Radiation (Supersedes NCRP Report No. 91). Bethesda, MD: NCRP Publications, 1993.

NCRP Report No. 115. Risk Estimates for Radiation Protection. Bethesda, MD: NCRP Publications, 1993.

NCRP Report No. 114 – Maintaining Radiation Protection Records. Bethesda, MD: NCRP Publications, 1992.

NCRP Report No. 113 – Exposure Criteria for Medical Diagnostic Ultrasound: I. Criteria Based on Thermal Mechanisms. Bethesda, MD: NCRP Publications, 1992.

NCRP Report No. 112 – Calibration of Survey Instruments Used in Radiation Protection for the Assessment of Ionizing Radiation Fields and Radioactive Surface Contamination. Bethesda, MD: NCRP Publications, 1991.

NCRP Report No. 111 – Developing Radiation Emergency Plans for Academic, Medical or Industrial Facilities. Bethesda, MD: NCRP Publications, 1991.

NCRP Report No. 108 – Conceptual Basis for Calculations of Absorbed-Dose Distributions. Bethesda, MD: NCRP Publications, 1991.

NCRP Report No. 107 – Implementation of the Principle of As Low As Reasonably Achievable (ALARA) for Medical and Dental Personnel. Bethesda, MD: NCRP Publications, 1990.

NCRP Report No. 105 – Radiation Protection for Medical and Allied Health Personnel (Supersedes NCRP Report No. 48). Bethesda, MD: NCRP Publications, 1989.

NCRP Report No. 104 – The Relative Biological Effectiveness of Radiations of Different Quality. Bethesda, MD: NCRP Publications, 1990.

NCRP Report No. 102 – Medical X-Ray, Electron Beam and Gamma-Ray Protection for Energies Up to 50 MeV (Equipment Design, Performance and Use (Supersedes NCRP Report No. 33). Bethesda, MD: NCRP Publications, 1989.

NCRP Report No. 101 – Exposure of the U.S. Population from Occupational Radiation. Bethesda, MD: NCRP Publications, 1989.

NCRP Report No. 100 – Exposure of the U.S. Population from Diagnostic Medical Radiation. Bethesda, MD: NCRP Publications, 1989.

NCRP Report No. 099 – Quality Assurance for Diagnostic Imaging. Bethesda, MD: NCRP Publications, 1988.

NCRP Report No. 096 – Comparative Carcinogenicity of Ionizing Radiation and Chemicals. Bethesda, MD: NCRP Publications, 1989.

NCRP Report No. 094 – Exposure of the Population in the United States and Canada from Natural Background Radiation (Supersedes NCRP Report No. 45). Bethesda, MD: NCRP Publications, 1987.

NCRP Report No. 093 – Ionizing Radiation Exposure of the Population of United States. Bethesda, MD: NCRP Publications, 1987.

NCRP Report No. 082 – SI Units in Radiation Protection and Measurements. Bethesda, MD: NCRP Publications, 1985.

NCRP Report No. 080 – Induction of Thyroid Cancer by Ionizing Radiation. Bethesda, MD: NCRP Publications, 1985.

NCRP Report No. 079 – Neutron Contamination from Medical Electron Accelerators. Bethesda, MD: NCRP Publications, 1984.

NCRP Report No. 069 – Dosimetry of X-Ray and Gamma-Ray Beams for Radiation Therapy in the Energy Range 10 keV to 50 MeV. Bethesda, MD: NCRP Publications, 1981.

NCRP Report No. 068 – Radiation Protection In Pediatric Radiology. Bethesda, MD: NCRP Publications, 1981.

16.3.15 Netherlands Commission on Radiation Dosimetry/Nederlandse Commissie voor Stralingsdosimetrie (NCS) reports

Some of the NCS reports are in English and some are in Dutch with an English summary. The reports are located at: www.stralingsdosimetrie.nl/ncs-report.php.

Human Exposure to Ionising Radiation for Clinical and Research Purposes: Radiation Exposure and Risk Estimates. Report 26, May 2016. http://radiationdosimetry.org/documents/ncs/human-exposure-to-ionising-radiation-for-clinical-and-research-purposes-radiation-dose-risk-estimates?worker=add_footer&text=The+NCS+report+has+been+&file=files/documents/0000096/264-ncs-report-26-radiation-dose-and-risk-estimates.pdf.

Process Management and Quality Assurance for Intracranial Stereotactic Treatment. Report 25. October 2015. http://radiationdosimetry.org/ncs/documents/process-management-and-quality-assurance-for-intracranial-stereotactic-treatment?worker=add_footer&text=The+NCS+report+has+been&file=files/documents/0000095/263-ncs-stereo-report20151108.pdf.

Code of Practice for the Quality Assurance and Control for Volumetric Modulated Arc Therapy. Report 24 of the Netherlands Commission on Radiation Dosimetry. http://radiationdosimetry.org/ncs/documents/code-of-practice-for-the-quality-assurance-and-control-for-vmat.

Code of Practice for Quality Assurance of Applicators and Transfer Tubes for Ir-192 Afterloaders. Netherlands Commission on Radiation Dosimetry. Preliminary report 9 July 2015. http://radiationdosimetry.org/documents/pre-publication-cop-appltranstubes.

Audit of High-Energy Photon Beams in Belgian and Dutch Radiotherapy Departments. Report 23 of the Netherlands Commission on Radiation Dosimetry. http://radiationdosimetry.org/files/documents/0000084/221-ncsreport23dosimetry-audit.pdf.

Code of Practice for the Quality Assurance and Control for Intensity Modulated Radiotherapy. Report 22 of the Netherlands Commission on Radiation Dosimetry. http://radiationdosimetry.org/files/documents/0000009/29-ncsreport22imrt-qa.pdf.

Dosimetry and quality control of brachytherapy with low-energy photon sources (125I). Report 20 of the Netherlands Commission on Radiation Dosimetry. Revised edition, June 2012. http://www.stralingsdosimetrie.nl/assets/files/ncs_report/NCSreport20-rev2012_06.pdf. http://radiationdosimetry.org/files/documents/0000011/136-ncsreport20-rev201206.pdf.

Code of practice for personal dosimetry of professionals wearing protective clothing during radiological procedures. Report 19 of the Netherlands Commission on Radiation Dosimetry. http://radiationdosimetry.org/files/documents/0000012/66-ncs-rapport-19-cop-personal-dosimetry-protective-clothing.pdf.

Code of Practice for the Absorbed Dose Determination in High Energy Photon and Electron Beams. Report 18 of the Netherlands Commission on Radiation Dosimetry. Revised edition, August 2012. http://radiationdosimetry.org/files/documents/0000014/38-ncsreport18revised-edition-august-2012.pdf.

Erratum of the August 2012 revised edition. http://radiationdosimetry.org/files/documents/0000014/37-erratum-ncs-report-18-rev.-2-august-2012.pdf.

Monte Carlo Treatment Planning: An Introduction. Report 16 of the Netherlands Commission on Radiation Dosimetry. June 2006. http://radiationdosimetry.org/files/documents/0000015/68-ncs-rapport-16-monte-carlo-treatment-planning.pdf.

Quality Assurance of 3-D Treatment Planning Systems for External Photon and Electron Beams: Practical Guidelines for Acceptance Testing, Commissioning and Periodic Quality Control of Radiation Therapy Treatment Planning Systems. Report 15 of the Netherlands Commission on Radiation Dosimetry. March 2005. http://radiationdosimetry.org/files/documents/0000016/69-ncs-rapport-15-qa-3-d-tps-external-photon-and-electron-beams.pdf.

Quality control of sealed beta sources in brachytherapy: Recommendations on detectors, measurement procedures and quality control of beta sources. Report 14 of the Netherlands Commission on Radiation Dosimetry. August 2004. http://radiationdosimetry.org/files/documents/0000017/70-ncs-rapport-14-qc-sealed-betasources-in-brachytherapie.pdf.

Quality Control in Brachytherapy: Current practice and minimum requirements. Report 13 of the Netherlands Commission on Radiation Dosimetry. November 2000. http://radiationdosimetry.org/files/documents/0000018/71-ncs-rapport-13-qc-in-brachytherapy.pdf.

Determination and use of scatter correction factors of megavoltage photon beams: Measurement and use of collimator and phantom scatter correction factors of arbitrarily shaped fields with a symmetrical collimator setting. Report 12 of the Netherlands Commission on Radiation Dosimetry. March 1998. http://radiationdosimetry.org/files/documents/0000019/228-ncs-rapport-12-scatter-correction-factors-mev-photon-beams2014.pdf.

Quality Control (QC) of Simulators and CT scanners and some basic QC methods for Treatment Planning Systems: current practice and minimum requirements. Report 11 of the Netherlands Commission on Radiation Dosimetry. September 1997. http://radiationdosimetry.org/files/documents/0000020/229-ncs-rapport-11-qc-simulators-ct-scanners-tps2014.pdf.

Dosimetry of low and medium energy x-rays, a code of practice for use in radiotherapy and radiobiology. Report 10 of the Netherlands Commission on Radiation Dosimetry. July 1997. http://radiationdosimetry.org/files/documents/0000033/79-ncs-rapport-10-dosimetry-of-low-and-medium-energy-xrays.pdf

Quality Control of Medical Linear Accelerators: Current Practice and Minimum Requirements. Report 9 of the Netherlands Commission on Radiation Dosimetry. August 1996. http://radiationdosimetry.org/files/documents/0000022/80-ncs-rapport-9-qc-medical-linear-accelerators.pdf.

Recommendations for the calibration of Iridium-192 high dose rate sources. Report 7 of the Netherlands Commission on Radiation Dosimetry. December 1994. http://radiationdosimetry.org/files/documents/0000024/82-ncs-rapport-7-calibration-125ir-hdr-sources.pdf.

16.4 Educators' Resource Guides and General Training Materials

AAPM Educators Resource Guides. http://www.aapm.org/education/ERG/.

European Training and Education for Medical Physics Experts in Radiology (EUTEMPE-RX). http://www.eutempe-rx.eu/.

European Training and Education in Radiation Protection (EUTERP). http://www.euterp.eu/.

EMERALD/EMIT on-line Medical Physics courses. http://emerald2.eu/cd/emerald2/.

On-line Ethics and Professionalism Modules. http://www.aapm.org/education/onlinemodules.asp.

HeadNeckBrainSpine, a website intended for those interested in neuroradiology anatomy and learning from neuroradiology cases. http://www.headneckbrainspine.com/index.php.

IAEA PowerPoint slides for IAEA Physics Handbooks (Radiation Oncology Physics, Diagnostic Radiology Physics, Nuclear Medicine Physics): http://www-naweb.iaea.org/NAHU/DMRP/handbooks/DMRPWebForm.asp.

IAEA e-Learning modules on Quality Assurance for SPECT systems:
https://humanhealth.iaea.org/HHW/MedicalPhysics/e-learning/QA_SPECT/index.html.
https://nucleus.iaea.org/HHW/MedicalPhysics/e-learning/index.html.

RSNA/AAPM On-line Physics Modules. http://www.aapm.org/education/webbasedmodules.asp.

Medical Physics Clinical Skills Workbook for Therapy Physics, 2012.
http://www.rosalindfranklin.edu/Portals/3/Documents/Clinical_Skills_Workbook_ONLINE_VERSION__Revised_10-23-12A%5B1%5D.pdf.

Training, Education and Assessment Program for Radiation Oncology Medical Physics. Australasian College of Physical Scientists and Engineers in Medicine, 2012-04-26.
http://www.acpsem.org.au/documents/item/44.

Teaching Medical Physics. Institute of Physics
http://www.iop.org/education/teacher/resources/teaching-medical-physics/page_54690.html.

Radiation Treatment Program (RTP) Learning Centre course on Ethics and Errors. Tom Baker Cancer Centre, Calgary, Alberta, Canada. Freely available. Need registration to get access.
http://www.rtp-learning-centre.ca/moodle/.

Modified teaching approach for an enhanced Medical Physics graduate education experience. I. B. Rutel. Biomed. Imaging Interv. J. 7, e28, 2011. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3265188/.

Radiation Treatment Planning Tutorial using the Prism treatment planning system.
http://www2.phys.canterbury.ac.nz/~physmed/prismtutorial/Mainpage.html. (See Meyer J, Hartmann B, Kalet I., A 'Learning by Doing' Treatment Planning Tutorial for Medical Physicists. Australas Phys. Eng. Sci. Med. 32:112–117 (2009).

e-Learning Development in Medical Physics and Engineering. S Tabakov. Biomed Imaging Interv. J. 4:e27 (2008). http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3097698/.

Methods and Resources for Physics Education in Radiology Residency Programs: Survey Results. L. Bresolin, G. S. Bisset 3rd , W. R. Hendee, and F. A. Kwakwa. Radiology 249:640–643 (2008).
http://radiology.rsna.org/content/249/2/640.long.

Teaching Medical Physics, National Stem Centre (STEM = science, technology, engineering and mathematics, in UK). http://www.nationalstemcentre.org.uk/elibrary/collection/565/teaching-medical-physics.

Open Educational Resources for Cancer (OERC). http://oerc.merlot.org.

Radiation Oncology Trainee's notes. http://ozradonc.wikidot.com/start.

Self-Scoring Quizzes. http://weber.ucsd.edu/~dkjordan/resources/quizzes/quizzes.html.

Multimedia Educational Resource for Learning and Online Teaching (MERLOT). http://www.merlot.org/.

Medical Dosimetry Certification Study Guide. K. N. G. Rajan. Madison, WI: Medical Physics Publishing, 2004.

Compilation of Radiobiology Practice Examinations: For Residents in Diagnostic Radiology and Radiation Oncology. J. D. Chapman, S. Shahabi, and B.A. Chapman. Madison, WI: Advanced Medical Publishing, 2000.

The Q Book–The Physics of Radiotherapy X-Rays: Problems and Solutions. P. Metcalfe, T. Kron, and P. Hoban. Madison, WI: Medical Physics Publishing, 1998.

Therapy Physics Review. B. Paliwal, Madison, WI: Medical Physics Publishing, 1996.

Compilation of Radiological Physics Examinations, Radiation Therapy, Volume 1. (RAPHEX – Radiological Physics Examination) S. V. Brownie and S. Shahabi, editors. Madison, WI: Advanced Medical Publishing, 1995.

16.5 Journals

American Journal of Roentgenology (AJR)

Applied Radiation and Isotopes (Appl Radiat Isot)

Australasian Physical & Engineering Sciences in Medicine (Australas Phys Eng Sci Med)

Biomedical Imaging and Intervention Journal (Biomed Imaging Interv J)

Brachytherapy

British Journal of Radiology (Br J Radiol)

Cancer

Cancer Journal (Cancer J.)

Cancer/Radiothérapie (Cancer Radiother.)

Clinical Oncology (Clin. Oncol.)

European Journal of Cancer (Eur. J. Cancer)

European Journal of Radiology (Eur. J. Radiol.)

Frontiers in Oncology (Front. Oncol.) Freely available open access journal available at: http://www.frontiersin.org/oncology.

Frontiers in Radiation Oncology (Front. Radiat. Oncol.) Freely available open access journal at: http://www.frontiersin.org/Radiation_Oncology.

Frontiers in Radiation Therapy and Oncology (Front. Radiat. Ther. Oncol.)

Health Physics (Health Phys.)

International Journal of Medical Physics, Clinical Engineering and Radiation Oncology (Int. J. Med. Phys. Clin. Eng. Radiat. Oncol.). Freely available open access journal at: http://www.scirp.org/journal/ijmpcero/.

International Journal of Radiation Oncology, Biology, Physics (Int. J. Radiat. Oncol. Biol. Phys.)

Journal of Applied Clinical Medical Physics (J. Appl. Clin. Med. Phys.) Freely available open access journal at: http://www.jacmp.org/index.php/jacmp.

Journal of Cancer Research and Therapeutics (J. Cancer Res. Ther.) Freely available open access journal at: http://www.cancerjournal.net/.

Journal of Clinical Oncology (J. Clin. Oncol.)

Journal of the ICRU (J. ICRU)

Journal of Medical Imaging and Radiation Oncology (J. Med. Imaging Radiat. Oncol.)

Journal of Medical Physics (J. Med. Phys.)

Journal of Radiotherapy in Practice (J. Radiother. Pract.)

Journal of Research of the National Institute of Standards and Technology (J. Res. Natl. Inst. Stan.). Freely available open access journal at: http://www.nist.gov/nvl/jres.cfm.

Journal of the American College of Radiology (J. Am. Coll. Radiol.)

Canadian Association of Radiologists Journal (Can. Assoc. Radiol. J.)

Lancet

Medical Dosimetry (Med. Dosim.)

Medical Engineering and Physics (Med. Eng. Phys.)

Medical Physics (Med. Phys.). Medical Physics open access papers:
http://scitation.aip.org/content/aapm/journal/medphys/info/open-access.

Nuclear Instruments and Methods (Nucl. Instrum. Methods)

Physica Medica: European Journal of Medical Physics (Phys. Medica.)

Physics in Medicine and Biology (Phys. Med. Biol.)

Practical Radiation Oncology (Pract. Radiat. Oncol.)

Radiation Measurement (Radiat. Meas.)

Radiation Protection Dosimetry (Radiat. Prot. Dosim.)

Radiation Oncology (Radiat. Oncol.) Freely available open access journal at: http://www.ro-journal.com/.

Radiation Research (Radiat. Res.)

Radiology

Radiotherapy and Oncology (Radioth. Oncol.)

Seminars in Radiation Oncology (Semin. Radiat. Oncol.)

Strahlentherapie und Onkologie (Strahlenther. Onkol.) German Journal but contains many articles in English.

Tumori

16.6 Reports and Websites on Safety Considerations and Errors in Radiation Therapy

European Commission. Radiation Protection No. 181. General Guidelines on Risk Management in External Radiotherapy. 2015. https://ec.europa.eu/energy/sites/ener/files/documents/RP181.pdf.

Technical Supplement to Radiation Protection No. 181. General Guidelines on Risk Management in External Beam Radiotherapy.
https://ec.europa.eu/energy/sites/ener/files/documents/AnnexeGuidelinesRP181.pdf.

RO-ILS: Radiation Oncology Incident Learning System. Co-sponsored by AAPM and ASTRO.
https://www.astro.org/Clinical-Practice/Patient-Safety/ROILS/Index.aspx.

European Basic Safety Standards for Ionizing Radiation Protection. COUNCIL DIRECTIVE 2013/59/EURATOM of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom.
https://ec.europa.eu/energy/sites/ener/files/documents/CELEX-32013L0059-EN-TXT.pdf.

Safety in Radiation Oncology (SAFRON). (Radiation oncology incident reporting system developed by the International Atomic Energy Agency, IAEA). Requires registration.
https://rpop.iaea.org/RPOP/RPoP/Content/News/safron.htm.

Safety Is No Accident: A Framework for Quality Radiation Oncology and Care. A.L. Zietman, J.R. Palta, and M. L. Steinberg, editors. American Society for Radiation Oncology (ASTRO). 2012. http://www.astro.org/uploadedFiles/Main_Site/Clinical_Practice/Patient_Safety/Blue_Book/SafetyisnoAccident.pdf.

Safety in Radiation Therapy: A Call to Action. AAPM/ASTRO 24-25 June 2010. Free access to presentations to AAPM members and conference participants. Cost for non-members and non-participants. http://www.aapm.org/meetings/2010SRT/default.asp.

Radiation Therapy Safety: The Critical Role of the Radiation Therapist. (White Paper) T. G. Odle and N. Rosier for the ASRT Education and Research Foundation Health Care Industry Advisory Council Subcommittee on Patient Safety and Quality in Radiation Therapy, 2012.

Manual for ACRO Accreditation. July 2013. American College of Radiation Oncology (ACRO), Bethesda, MD, 2013. http://www.acro.org/Accreditation/ACROAccreditationManual.pdf.

ACRO Redbook 2009 for Radiation Oncology practice accreditation. http://www.acro.org/Accreditation/redbook.cfm.

Recommendations for safer radiotherapy: what's the message? P. Dunscombe. Front. Radiat. Oncol. 2: Article 129, 1–6, 2012. http://www.frontiersin.org/Radiation_Oncology/10.3389/fonc.2012.00129/full.

Radiation Oncology Practice Standards: A Tripartite Initiative. 2011. The Royal Australian and New Zealand College of Radiologists (RANZCR), Australian Institute of Radiography (AIR), The Australasian College of Physical Scientists and Engineers in Medicine (ASPSEM). http://www.ranzcr.edu.au/quality-a-safety/radiation-oncology/tripartite-radiation-oncology-practice-standards.

Preventing Accidental Exposures from New External Beam Radiation Therapy Technologies. ICRP Publication 112. International Commission on Radiological Protection (ICRP). Annals of the ICRP 39. Oxford, Pergamon Press, 2009.

The European Federation of Organisations for Medical Physics Policy Statement No. 13: Recommended guidelines on the development of safety and quality management systems for Medical Physics departments. S. Christofides. Phys. Med. 25: 61–165 (2009). http://www.efomp.org/images/docs/policy/EFOMP%20Statement%2013.pdf.

Radiotherapy Risk Profile: Technical Manual. Geneva: World Health Organization, 2008. http://www.who.int/patientsafety/activities/technical/radiotherapy_risk_profile.pdf.

Towards Safer Radiotherapy. The Royal College of Radiologists, Society and College of Radiographers, Institute of Physics and Engineering in Medicine, National Patient Safety Agency, British Institute of Radiology. London: The Royal College of Radiologists, 2008. https://www.rcr.ac.uk/docs/oncology/pdf/Towards_saferRT_final.pdf.

The European Federation of Organisations for Medical Physics Policy Statement No. 13: Recommended guidelines on the development of safety and quality management systems for Medical Physics departments. S. Christofides. Physica Medica 25:161–165 (2009). http://www.efomp.org/images/docs/policy/EFOMP%20Statement%2013.pdf.

Radiation Oncology Safety Information System (ROSIS). http://www.rosis.info/index.php?content=about.

TreatSafely. Improving Quality and Safety for PatientMedicine. Includes free on-line learning lecture series. http://www.treatsafely.org/.

Institute for Healthcare Improvement (includes quality improvement tools). http://www.ihi.org.

A Reference Guide for Learning from Incidents in Radiation Treatment. HTA Initiative #22. Alberta Heritage Foundation for Medical Research, October 2006.
http://www.ihe.ca/advanced-search/a-reference-guide-for-learning-from-incidents-in-radiation-treatment.

Quantitative Approaches to Patient Safety: Research in Risk Analysis and Risk Management as Applied to Radiotherapy. HTA Initiative #15. Alberta Heritage Foundation for Medical Research, October 2004.

Safety Culture Policy Statement. U.S. Nuclear Regulatory Commission (NRC).
http://pbadupws.nrc.gov/docs/ML1117/ML11173A052.pdf.

Conceptual Framework for International Classification for Patient Safety, Final Technical Report. v1.1. January 2009. World Health Organization (WHO).
http://www.who.int/patientsafety/taxonomy/icps_full_report.pdf.

16.7 Miscellaneous Resources

16.7.1 Patient protection

Canadian Patient Safety Institute. http://www.patientsafetyinstitute.ca/English/Pages/default.aspx.

Protection of Pregnant Patients during Diagnostic Medical Exposures to Ionising Radiation: Advice from the Health Protection Agency, the Royal College of Radiologists and the College of Radiographers. Documents of the Health Protection Agency: Radiation, Chemical and Environmental Hazards, 2009.
http://www.ipem.ac.uk/Portals/0/Images/Protection%20of%20pregnant%20patients.pdf.

UK National Patient Safety Agency. http://www.npsa.nhs.uk/.

US, National Patient Safety Foundation. http://www.npsf.org/.

US Department of Veteran Affairs, National Center for Patient Safety. Safety in Radiation Therapy: A Call to Action.

AAPM/ASTRO 24-25 June 2010. Free access to presentations to AAPM members and conference participants. Cost for non-members and non-participants. http://www.aapm.org/meetings/2010SRT/default.asp.

16.7.2 Policy statements/special procedures

AAPM Policy Statements: Professional/Educational/Science.
http://www.aapm.org/org/policies/policy.asp?type=PP.

Management of Radiation Oncology Patients with a Pacemaker or ICD. Radiat. Oncol. 7:198–doi:10.1186/1748-717X-7-198. http://www.ro-journal.com/content/pdf/1748-717X-7-198.pdf.

16.7.3 Conference proceedings

Physical, Chemical and Biological Targeting in Radiation Oncology: 7th International Conference on Dose, Time and Fractionation in Radiation Oncology. M. Mehta, B. R. Paliwal, and S. M. Bentzen, editors. Madison, WI: Medical Physics Publishing, 2006.

Sixth International Conference on Dose, Time and Fractionation in Radiation Oncology: Biological and Physical Basis of IMRT and Tomotherapy. Madison, WI: Medical Physics Publishing, 2001.

Fifth International Conference on Dose, Time and Fractionation in Radiation Oncology: Volume and Kinetics in Tumor Control and Normal Tissue Complications. Madison, WI: Medical Physics Publishing, 1997.

Optimization of Cancer Radiotherapy: Proceedings of the 2nd International Conference on Dose, Time Fractionation in Radiation Oncology. B. R. Paliwal, D. E. Herbert, and C. G. Orton, editors. College Park, MD: American Institute of Physics, 1985.

16.7.4 Radiological emergency response

Medical Response to a Major Radiologic Emergency: A Primer for Medical and Public Health Practitioners. A. B. Wolbarst, A. L.Wiley, J. B. Nemhausr, D. M. Chrsitensen, and W. R. Hendee. Radiology 254:660–667 (2010). http://radiology.rsna.org/content/254/3/660.long.

Disaster Preparedness for Radiology Professionals: Response to Radiological Terrorism. A Primer for Radiologists, Radiation Oncologists, and Medical Physicists. Government Version 3.0. American College of Radiology (ACR), 2006. http://www.acr.org/~/media/ACR/Documents/PDF/Membership/Legal%20Business/Disaster%20Preparedness/ Primer.pdf.

Procedures for Medical Emergencies Involving Radiation. Modified from K. Miller and M. Erdman. Health Physics Considerations in Medical Radiation Emergencies, Operational Radiation Safety. Health Phys 87 (Suppl 1):S19–S24 (2006). Adopted: 2006. http://hpschapters.org/sections/homeland/documents/Dec_31_Reformatted_MRE_Chart.pdf.

Medical Response Work Group. Health Physics Society.

16.7.5 Miscellaneous

Encyclopaedia of Medical Physics. S. Tabakov, F. Milano, S-E. Strand, C. Lewis, and P. Sprawls, editors. Boca Raton, FL: Taylor and Francis, 2012.

The Invisible Passenger: Radiation Risks for People Who Fly, 2nd edition. R. J. Barish. Madison, WI: Advanced Medical Publishing, 2008.

Making Sense of Radiation: A Guide to Radiation and Its Health Effects. Published by Sense About Science in collaboration with the British Institute of Radiology, the Institute of Physics and Engineering in Medicine, and the Institution of Medical Engineers, 2008. http://www.senseaboutscience.org/data/files/resources/8/MSofRadiation_2011.pdf.

Global Task Force on Radiotherapy for Cancer Control. www.gtfrcc.org.

GlobalRT: GTFRCC Young Leaders Initiative. http://globalrt.org/.

16.8 On-line Resources

American Association of Medical Physicists (AAPM) CT Lexicon. http://www.aapm.org/pubs/CTProtocols/documents/CTTerminologyLexicon_2012-03-20.pdf.

American Association of Medical Physicists (AAPM) Medical Physics Resource Page. http://www.aapm.org/links/medphys/default.asp.

American Society for Radiation Oncology (ASTRO) Model Policies. https://www.astro.org/Practice-Management/Reimbursement/Model-Policies.aspx.

Chart Rounds: Chartrounds brings together academic disease site specialists from leading cancer treatment institutions and connects them with the Chartrounds network of over 1300 physicians and medical physicists. On a scheduled basis, discuss patient management and treatment plans with trusted colleagues in real time. https://www.chartrounds.com/default.aspx.

Common Terminology Criteria for Adverse Events v4.0 (CTCAE) and Common Toxicity Criteria, National Cancer Institute, Cancer Therapy Evaluation Program. http://ctep.cancer.gov/protocolDevelopment/electronic_applications/ctc.htm#ctc_40.

Dosimetry parameters for source models used in brachytherapy. http://www.uv.es/braphyqs/.

eContour, a contouring resource from University of California, San Diego. http://eContour.org/

EMITEL e-Encyclopaedia of Medical Physics and Multi Lingual Dictionary Terms. http://www.emitel2.eu/emitwwwsql/index-login.aspx.

EMITEL: Medical Physics Dictionary. http://emitdictionary.co.uk/emitdictionary/index.htm.

Figures in Radiation History. http://www.orcbs.msu.edu/radiation/resources_links/historical_figures/historical_figures.htm.

Global Oncology. Global Cancer Project Map. http://globalonc.org/Projects/global-cancer-project-map/.

Histogram Analysis in Radiation Therapy (HART). http://hart.research.uic.edu/.

International Atomic Energy Agency (IAEA) Radiation Protection of Patients (RPOP). https://rpop.iaea.org/RPoP/RPoP/Content/index.htm.

International Atomic Energy Agency (IAEA) Human Health Campus. http://nucleus.iaea.org/HHW/Home/more.html.

International Organization of Medical Physicists (IOMP) resource page with bibliographic data. http://www.iomp.org/?q=node/34.

IROC Houston Quality Assurance Center (formerly known as the Radiological Physics Center). http://rpc.mdanderson.org/rpc/.

Medical Physics Resources. Integrated Environment Management, Inc.: http://www.iem-inc.com/.

Medical Physics Web. http://medicalphysicsweb.org/.

NIST Reference on Constants, Units, and Uncertainty. http://physics.nist.gov/cuu/index.html.

Public Radio International (PRI). Cancer's Global Footprint (World map showing incidence of major cancers). http://globalcancermap.com/.

Radiation Therapy Oncology Group (RTOG) Study Protocols. http://www.rtog.org/ClinicalTrials/ProtocolTable.aspx.

The Radiation Information Network. http://www.physics.isu.edu/radinf/.

ResearchGate. (Social networking site for scientists – includes medical physics, radiation therapy, and imaging professionals and topics.) http://www.researchgate.net/.

RT Answers (for patients ... developed by ASTRO). http://www.rtanswers.org/aboutus/index.aspx.

Surveillance Epidemiology and End Results (SEER). National Cancer Institute, U.S. National Institutes of Health. (Provides information on cancer statistics) http://seer.cancer.gov/.

SEER Self Instructional Manuals for Tumor Registrars. http://seer.cancer.gov/training/manuals/.

TDF Plan: BED Calculations. http://www.eyephysics.com/tdf/BEDCalcs.htm.

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). http://www.unscear.org/.

U.S. National Nuclear Data Center. http://www.nndc.bnl.gov/.

US National Quality Forum. The National Quality Forum (NQF) is a not-for-profit, nonpartisan, membership-based organization that works to catalyse improvements in healthcare. http://www.qualityforum.org/Home.aspx.

16.9 Mailing Lists/Discussion Forums

American Medical Physics mailing list. http://lists.wayne.edu/cgi-bin/wa?A0=MEDPHYSUSA.

Global Medical Physics mailing list. http://lists.wayne.edu/cgi-bin/wa?A0=MEDPHYS.

Radiation Therapy mailing list (for radiation therapy professionals). http://health.groups.yahoo.com/group/RADIATIONTHERAPY/.

16.10 Guide to Medical Physics Practice

Guide to Medical Physics Practice. American College of Radiology. http://www.acr.org/Membership/Legal-Business-Practices/Group-Practice-Resources/Guide-to-Medical-Physics-Practice.

What Do Medical Physicists Do? AAPM website. http://www.aapm.org/medical_physicist/default.asp.

Technical Standards for Medical Physics Practice. American College of Radiology (ACR). http://www.acr.org/Quality-Safety/Standards-Guidelines/Technical-Standards-by-Modality/Medical-Physics.

Glossary of Nuclear Science Terms. http://ie.lbl.gov/education/glossary/glossaryf.htm.

16.11 On-line Medical Physics-related Staffing Information

Staffing in Radiotherapy: An Activity Based Approach. Vienna: International Atomic Energy Agency (IAEA), 2015. http://www-pub.iaea.org/books/IAEABooks/10800/Staffing-in-Radiotherapy-An-Activity-Based-Approach.

Medical Physics Staffing for Radiation Oncology: Report on a Decade of Experience in Ontario, Canada. J. J. Battista, B. G. Clark, M. S. Patterson, L. Beaulieu, M. S. Sharpe, L. J. Schreiner, M. S. MacPherson, and J. Van Dyk. J. Appl. Clin. Med. Phys. 13:93–110 (2012). http://www.jacmp.org/index.php/jacmp/article/view/3704/2383 and http://www.jacmp.org/index.php/jacmp/article/view/3915/2434 (Erratum).

Manual for ACRO Accreditation. July 2013. Bethesda, MD: American College of Radiation Oncology (ACRO), 2012. http://www.acro.org/Accreditation/ACROManualWeb%209-21-12.pdf and http://www.acro.org/Accreditation/ACROAccreditationManual.pdf.

Safety Is No Accident: A Framework for Quality Radiation Oncology and Care. A. L. Zietman, J. R. Palta, and M. L. Steinberg, editors. American Society for Radiation Oncology (ASTRO), 2012. https://http://www.astro.org/uploadedFiles/Main_Site/Clinical_Practice/Patient_Safety/Blue_Book/SafetyisnoAccident.pdf.

Projecting the Radiation Oncology Workforce in Australia. D. Schofield, E. Callander, M. Kimman, J. Scuteri, and L. Fodero. Asian Pac. J. Cancer Prev. 13:1159–1166 (2012). http://www.apocpcontrol.org/paper_file/issue_abs/Volume13_No4/1159-66%203.19%20Deborah%20Schofield.pdf.

Medical Physicist Workforce Study. Health Workforce Australia. 2012. http://www.hwa.gov.au/sites/uploads/20120912_FINAL_Medical%20Physicists%20Report_M1_0.pdf.

Projecting the Radiation Oncology Workforce: Input to the Tripartite National Strategic Plan for Radiation Oncology in Australia. Report to The Royal Australian and New Zealand College of Radiologists. 2012. http://www.acilallen.com.au/cms_files/acgprojectingoncologyworkforce2012.pdf.

Workforce Study of Medical Physicists in the U.S. M. Langelier and G. Forte. Center for Health Workforce Studies School of Public Health, University at Albany, Rensselaer, NY, 2010. http://www.aapm.org/pubs/protected_files/surveys/workforce/Synthesis.pdf.

Future trends in the supply and demand for radiation oncology physicists. M. D. Mills, J. Thornewill, and R. J. Esterhay. J. Appl. Clin. Med. Phys.11:209–219 (2010). http://www.jacmp.org/index.php/jacmp/article/view/3005/1826.

A grid to facilitate physics staffing justification. E. E. Klein. J. Appl. Clin. Med. Phys. 11:263–273 (2010). http://www.jacmp.org/index.php/jacmp/article/view/2987/1749.

A 2009 survey of the Australasian clinical medical physics and biomedical engineering workforce. W. H. Round. Australas Phys. Eng. Sci. Med. 33:153–162 (2010). http://researchcommons.waikato.ac.nz/handle/10289/4245.

Victorian Medical Radiations Workforce Supply and Demand Projections (2010–2030). H. Zhang. Modelling, GIS and Planning Products Unit, Victorian Government, Department of Health, Melbourne, Victoria, Australia, 2010. http://docs.health.vic.gov.au/docs/doc/8327D7F888AC8588CA25785C000BE4DD/$FILE/medical-radiation.pdf.

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Abt Associates Inc. The Abt Study of Medical Physicist Work Values for Radiation Oncology Physics Services: Round II. Final Report June 2003. http://www.aapm.org/pubs/reports/ABTReport.pdf.

Equipment, Workload and Staffing for Radiotherapy in the UK 1997–2002. Royal College of Radiologists, UK. 2003. https://www.rcr.ac.uk/sites/default/files/publication/equipment_scot.pdf.

Criteria for the staffing levels in a Medical Physics Department. Policy Statement. The European Federation of Organisations for Medical Physics (EFOMP), 1997.

16.12 Medical Physics Graduate Schools

CAMPEP Accredited Medical Physics Graduate Programs. http://www.campep.org/campeplstgrad.asp.

CAMPEP Accredited Residency Programs in Medical Physics. http://www.campep.org/campeplstres.asp.

Non-CAMPEP Accredited Programs in Medical Physics. http://www.aapm.org/education/noncampep.asp.

Canadian universities offering graduate programs in Medical Physics. https://www.comp-ocpm.ca/english/membership-services/for-students/graduate-programs.html.

Canadian institutions offering medical physics residency programs. https://www.comp-ocpm.ca/english/career-education/career-resources/residency-programs.html.

Ontario Medical Physics Residency Programs. https://www.cancercare.on.ca/cms/one.aspx?pageId=9352.

16.13 Medical Physics Jobs

AAPM Career Services. http://careers.aapm.org/.

Health Physics-related Employment Website. http://www.physics.isu.edu/radinf/hpjob.htm.

Job Rapido. http://ca.jobrapido.com/.

Physics Today jobs. http://jobs.physicstoday.org/.

16.14 Medical Physics-related Organizations

American Association of Physicists in Medicine (AAPM). http://www.aapm.org/.

American College of Radiology (ACR). http://www.acr.org/.

American Society for Radiation Oncology (ASTRO). https://www.astro.org/.

Argentinian Society of Medical Physicists/Sociedad Argentina de Física Médica (SAFIM). http://www.safim.org.ar/home.php.

Asia-Oceania Federation of Organizations for Medical Physics (AFOMP). http://www.afomp.org/.

Association of Medical Physicists of India (AMPI). http://ampi.org.in/.

Association of Medical Physicists in Russia (AMPHR). http://www.amphr.ru/engl.php.

Australasian College of Physical Scientists and Engineers in Medicine (ACPSEM). http://www.acpsem.org.au/.

Australasian Radiation Protection Society (ARPS). http://www.arps.org.au/.

Austrian Society for Medical Physics/Österreichische Gesellschaft für Medizinische Physik (ÖGMP). http://www.oegmp.at/.

Bangladesh Medical Physics Association (BMPA). http://bmpaweb.org/.

Belgian Hospital Physicists Association (BHPA). http://www.bhpa.eu/.

Brazilian Association of Medical Physics/Associação Brasileira de Física Médica (ABFM). http://www.abfm.org.br/.

Bulgarian Society of BioMedical Physics and Engineering (BSBPE). http://bsbpe.org/.

Canadian College of Physicists in Medicine (CCPM). http://www.ccpm.ca/.

Canadian Organization of Medical Physicists (COMP). http://www.medphys.ca/.

Canadian Radiation Protection Association (CRPA). http://www.crpa-acrp.org/.

Chinese Society of Medical Physics (CSMP). http://www.csmp.org.cn/.

Chinese Society of Medical Physics, Taipei (CSMPT).

Cyprus Association of Medical Physics and BioMedical Engineering (CAMPBE). http://www.campbe.org/.

Czech Association of Medical Physicists/Ceská spolecV nost fyziku° v medicíneˇ (CSFM). http://www.csfm.cz/index.php?text=39.

Danish Society for Medical Physics (DSMF). http://www.dsmf.org/.

European Federation of Organisations for Medical Physics (EFOMP). http://www.efomp.org/.

European Organization for Research and Treatment of Cancer (EORTC). http://www.eortc.org/.

European Society for Radiotherapy and Oncology (ESTRO). http://estro.org/.

Federation of African Medical Physics Organisations (FAMPO). http://www.federation-fampo.org/.

Finnish Association of Medical Physicists. http://www.sairaalafyysikot.fi/.

French Society of Medical Physics/Société Française de Physique Médicale (SFPM). http://www.sfpm.asso.fr/.

German Society of Medical Physics/Deutsche Gesellschaft für Medizinische Physik (DGMP). http://www.dgmp.de/.

Health Physics Society (HPS). http://hps.org/.

Hellenic Association of Medical Physicists (HAMP), Greece. http://www.efie.gr/index.php?lang=en.

Hong Kong Association of Medical Physics (HKAMP). http://www.hkamp.org/hkamp/index.html.

Indonesian Medical Physics and Biophysics Association (HFMBI). https://sites.google.com/site/medphysindonesia/.

Institute of Physics and Engineering in Medicine (IPEM). http://www.ipem.ac.uk/.

International Centre for Theoretical Physics (ICTP). http://www.ictp.it/.

International Organization of Medical Physicists (IOMP). http://iomp.org/.

International Radiation Protection Association (IRPA). http://www.irpa.net/.

Iranian Association of Medical Physicists (IAMP). http://www.iamp.ir/.

Irish Association of Physicists in Medicine (IAPM). http://www.theiapm.ie/.

Italian Association of Medical Physicists/Associazione Italiana di Fisica Medica (AIFM). http://www.fisicamedica.it/aifm/01_home/index.php.

Japan Society of Medical Physics (JSMP). http://www.jsmp.org/english/.

Jordanian Association for Physicists in Medicine (JAPM). http://www.japm.org/.

Korean Society of Medical Physics (KSMP). http://www.ksmp.or.kr/.

Latin American Association of Medical Physicists/Asociación Latinoamericana de Fisica Médica (ALFIM). http://www.alfim.net/.

Macedonian Association for Medical Physics and Biomedical Engineering. http://www.zmfbi.org.mk/zmfbi/home.html.

Malaysian Association of Medical Physics (MAMP).

Medical Physicists Without Borders (MPWB). www.MPWB.org.

Mephida. http://www.mephida.com/.

Middle East Federation of Organizations of Medical Physics (MEFOMP). http://mefomp.org/.

Moroccan Association of Medical Physics/Association Marocaine de Physique Médicale (AMPM). http://www.asso-ampm.com/.

Nepalese Association of Medical Physicists (NAMP).

Netherlands Society of Clinical Physicists/Nederlandse Vereniging voor Klinische Fysica (NVKF). (Web-site is in Dutch). http://www.nvkf.nl/.

Nordic Association of Clinical Physics (NACP). http://www.nacp-nordisk.org/.

Nordic Society for Radiation Protection (NSFS). http://www.nsfs.org/.

North American Chinese Medical Physicist Association (NACMPA). http://www.nacmpa.org/nacmpa1/index.htm.

Norwegian Association of Medical Physicists (NFMF). http://www.medfys.no/home/.

Philippine Association for Radiation Protection (PARP). http://parpinc.wordpress.com/.

Physicien Médical Sans Frontières (PMSF, French Medical Physicists Without Borders). http://www.pmsf.asso.fr/.

Portugese Society of Physicists, Division of Medical Physics. http://dfm.spf.pt/.

Radiological Society of North America (RSNA). http://www.rsna.org/.

Romanian College of Medical Physicists (CFMR): www.medicalphysics.ro.

Saudi Medical Physics Society (SMPS). http://www.smps.org.sa/.

Mexican Society of Physicists/Division of Medical Physicist (Sociedad Mexicana de Física/División de Física Médica). http://www.smf.mx/~dfm-smf/.

Society of Euro-American Medical Physicists (SEAMP). http://seamp.org/.

South African Association of Physicists in Medicine and Biology (SAAPMB). http://www.saapmb.net/.

South-East Asian Federation of Organizations for Medical Physics (SEAFOMP). https://sites.google.com/a/sci.ui.ac.id/seafomp/.

Spanish Society of Medical Physics (SEFM). http://www.sefm.es/.

Sri Lanka Medical Physics Association (SLMPA).

Swedish Society for Radiation Physics. http://www.radiofysik.org/.

Swiss Society of Radiobiology and Medical Physics (SSRMP). http://www.sgsmp.ch/.

Thai Medical Physicist Society (TMPS). http://www.tmps.or.th/submainpages/main.html.

Union for International Control of Cancer (Union Internationale Contre le Cancer, UICC). http://www.uicc.org/.

Vietnam Association of Medical Physics (VAMP).

World Health Organization (WHO). http://www.who.int/en/.

16.15 Medical Physics and Radiation Oncology-related Aid and Non-government Organizations

Above and Beyond Cancer. http://aboveandbeyondcancer.org/.

AMPATH. http://www.ampathkenya.org/.

Association Cancérologues sans Frontières (French for “Oncologists Without Borders.”) http://www.cancerologuesansfrontieres.com/.

African Organization for Research and Training in Cancer (AORTC). http://www.aortic-africa.org/.

International Campaign for Establishment and Development of Oncology Centers (ICEDOC) (and ICE-DOC's Experts in Cancer Without Borders). http://www.icedoc.org/.

International Network for Cancer Treatment and Research (INCTR). http://www.inctr.org/.

Medical Physicists Without Borders. www.MPWB.org.

Partners in Health. http://www.pih.org/.

Physicien Médical Sans Frontières (PMSF) (French for "Medical Physicists Without Borders.") http://www.pmsf.asso.fr/.

Radiating Hope. http://www.radiatinghope.org/.

Radiation Safety Without Borders. (Flyer) http://hps.org/documents/rswb_flyer.pdf.

Union for International Control of Cancer (Union Internationale Contre le Cancer, UICC). http://www.uicc.org/.

World Cancer Research Fund International (WCRF). http://www.wcrf.org/.

16.16 Regulatory Information

Canadian Nuclear Safety Commission. http://www.nuclearsafety.gc.ca/.

U.S. Environmental Protection Agency (EPA) Radiation Protection Programs. http://www.epa.gov/radiation/.

U.S. Food and Drug Administration – Radiation-Emitting Products. http://www.fda.gov/Radiation-EmittingProducts/default.htm.

U.S. Nuclear Regulatory Commission. http://www.nrc.gov/.

Standards for Protection Against Radiation. U.S. Nuclear Regulatory Commission. http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/full-text.html.

Regulatory Resources from Medical Physics Consultants, Inc. http://www.mpcphysics.com/resources.cfm.

16.17 Publications Search Websites

Google Scholar. Scientific journal search engine. http://scholar.google.com/.

FreeFullPDF. Free medical/scientific publications. http://www.freefullpdf.com/.

HubMed. "An alternative interface to the PubMed medical literature database." http://www.hubmed.org/.

Medical Physics. Open access papers. http://scitation.aip.org/content/aapm/journal/medphys/info/open-access.

MedlinePlus. "National Institutes of Health's website for patients and their families and friends." http://www.nlm.nih.gov/medlineplus/aboutmedlineplus.html.

OJOSE (Online JOurnal Search Engine). Makes "search-queries in different databases by using only 1 search field." http://www.ojose.com/.

PubMed. U.S. National Library of Medicine. National Institutes of Health. Search engine for biomedical literature. http://www.ncbi.nlm.nih.gov/pubmed.

The Cochrane Library. "Independent high-quality evidence for health care decision making." http://www.thecochranelibrary.com/view/0/index.html.

16.18 Smart Phone Applications

Anatomy Atlas: Anatomy reference with lots of drawings.
https://itunes.apple.com/us/app/anatomy- atlas/id295806778?mt=8.

Anatomy Lite: Reference for people who want to know more about human anatomy.
https://itunes.apple.com/us/app/anatomy-lite/id300369917?mt=8.

BED calculator: Calculates biologically effective dose (BED) based on the linear-quadratic model (LQ) model. https://itunes.apple.com/au/app/bed-calculator-radiation-dose/id397088240.

Brain MRI Atlas: Navigates through hundreds of labeled brain structures.
https://itunes.apple.com/us/app/brain-mri-atlas/id431556580?mt=8.

Cancer in the Developing World. Oxford University.
https://itunes.apple.com/us/itunes-u/cancer-in-developing- world/id381702078?mt=10.

CT-Gently: A tool that can be used to estimate radiation doses to the organs from CT and CBCT scans based on a person's anatomic information and scan mode. In addition, it can be used to compare optimized mAs and kVp settings with reference settings for personalized low-dose CT and CBCT scans.
https://itunes.apple.com/us/app/ct-gently/id654734773?mt=8.

Ctp-ROPE: Teaching tools for radiation oncology physics. Temperature-pressure corrections.
http://download.cnet.com/Ctp-ROPE/3000-20415_4-75730169.html.

DoseCalc: Rapid calculation of parameters associated with use of radioisotopes.
https://itunes.apple.com/us/app/dosecalc/id305663994.

Equivalent dose, EQD2, calculator: http://www.buhl-development.dk/apps/eqd2/.

Electron Stopping Power. https://play.google.com/store/apps/details?id=dk.au.aptg.dEdx.

eLQ: Radiation Therapy Dose Calculator. Linear Quadratic Model. http://www.sfjro.fr/ilq/en/.
See Pract. Radiat. Oncol. 1:212–13 (2011) for a description of this app.
http://www.practicalradonc.org/article/S1879-8500(11)00155-X/fulltext.

Geiger Calc: Performs calculations after entering measured data.
https://itunes.apple.com/us/app/geiger-calc/id453282329.

IAEA smartphone app for cancer staging: https://www.iaea.org/newscenter/news/towards-optimal-cancer-treatment-iaea-launches-new-smartphone-app-cancer-staging.

Medical Physics Box. https://itunes.apple.com/us/app-bundle/medical-physics-box/id917709770?mt=8.

My Radiotherapy Experience. http://radiotherapyxp.android.informer.com/.

Nano, micro, milli convert: Converts some prefixes (nano, micro, milli, and none) to other prefixes. Also converts per second, per minute, per hour, and per year.
https://itunes.apple.com/us/app/nano-micro-milli- convert/id431603882.

Radiation Calculator: Developed to learn about many types of imaging studies and also to track your radiation exposure. https://itunes.apple.com/us/app/radiation-calculator/id451907773.

Radiation Oncologist Tool: Calculates Isoeffective dose in 2 Gy fractions and Isoeffective dose of schedule with multiple fractions per day.
https://itunes.apple.com/us/app/radiation-oncologist-tool/id440336064?mt=8.

Radiation Therapy Flash Card.
https://play.google.com/store/apps/details?id=org.campkim.radiationtherapyflashcard&hl=en.

Radiological Anatomy. https://itunes.apple.com/us/app/radiological-anatomy/id540569113?mt=8.

Radiotherapy and Oncology.
https://itunes.apple.com/au/app/radiotherapy-and-oncology/id643019661?mt=8.

RadOnc Reference. Calculates - General: Body Mass Index, Body Surface Area, Performance Status, Life Expectancy. Physics: BED Calculator, EQD2 Calculator. Breast: ASTRO APBI Guidelines.
https://itunes.apple.com/au/app/radonc-reference/id563419791?mt=8.

TDFCalc for iPhone. http://eyephysics.com/tdf/iphone/.

TG-51 App by Alan Mayville. https://itunes.apple.com/us/app/tg-51/id1071013271?ls=1&mt=8.

Two-dimensional Fourier transform of an image, 2D-Fourier: https://itunes.apple.com/ca/app/2d-fourier/id459376080?mt=8.

Wolfram Radiation Protection Reference App calculates shielding requirements, CSDA ranges of different particles, equivalent doses, decay of radioisotopes, and unit conversions.
https://itunes.apple.com/cn/app/wolfram-radiation-protection/id552507965?mt=8.

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