Medical Physics Practice Guidelines:
The AAPM Minimum Practices Recommendations for Medical Physicists

Maria Chan and Joann Prisciandaro
Co-Chairs, Subcommittee of Practice Guidelines, AAPM

55th Annual Meeting of AAPM, August 8, 2013 @ Indianapolis

Outline

How we got here:

- AAPM's history of Task Group work & reports
- ACR's history of Technical Standards & Practice Guidelines
- Focus on medical errors and role of regulations
- Requirements for clinic accreditation
- Multiple accrediting entities

Medical Physics Practice Guidelines

- Vision and scope
- Development

2

AAPM Task Group History

- Significant volunteer activity by domain experts to develop technical reference documents
- Often developed by the "premier centers" in the country
- Task Groups' purpose is not to define a minimum practice standard, but rather to create useful technical reference documents for practicing medical physicists

3

ACR Documents

- Developed through a consensus-focused process with broad representation by different practice environments
- Aim to define a minimum practice standard
- Significant physician influence
- Devoid of much specificity

4

MIPPA

- Medicare Improvements for Patients and Providers Act of 2008:
  - Signed into law in July 2008
  - Requires practice accreditation for the "advanced imaging" modalities which includes CT, MR, and Nuclear Medicine
  - Does not include x-ray, fluoroscopy, sonography, or anything in radiation oncology
  - Does not apply to hospitals

5

Accrediting Bodies Under MIPPA

- American College of Radiology
- Intersocietal Accreditation Commission
- The Joint Commission
- ***The Problem/Concern***
  - **All have different requirements for personnel - AAPM is on record indicating concern with not requiring board certification for medical physicists**

6

ASTRO's Position

AMERICAN SOCIETY FOR RADIATION ONCOLOGY
2010 YEAR IN REVIEW
TARGET SAFELY

Launching a significantly enhanced practice accreditation program and beginning the development of additional accreditation modules specifically addressing new, advanced technologies such as IMRT, SBRT and brachytherapy.

7

ACR's Position

ACR American College of Radiology
Quality is Our Image

ACR Calls for Mandatory Accreditation of All Advanced Imaging and Radiation Oncology Providers

The ACR believes Congress should expand the current MIPPA accreditation requirements for advanced imaging to include radiation therapy. In addition, the accreditation mandate should apply to all facilities, including hospital settings. Furthermore, the accrediting of these imaging and radiation therapy procedures should only be conducted by those accrediting bodies with experience and expertise in the area for which they are accrediting.

8

ASTRO-AAPM: Patient safety

Practical Radiation Oncology (2011) 1, 16–21
pro www.practicalradonc.org

Special Article

Improving patient safety in radiation oncology

William R. Hendee PhD[a], Michael G. Herman PhD[b,*]

[a]Medical College of Wisconsin, Rochester, Minnesota
[b]Department of Radiation Oncology, Mayo Clinic, Rochester, Minnesota

Received 5 November 2010; accepted 12 November 2010

Abstract Beginning in the 1990s, and emphasized in 2000 with the release of an Institute of Medicine report, health care providers and institutions have dedicated time and resources to reducing errors that impact the safety and well-being of patients. However, in January 2010, the first of a series of articles appeared in *The New York Times* that described errors in radiation oncology that grievously impacted patients. In response, the American Association of Physicists in Medicine and the American Society for Radiation Oncology sponsored a working meeting entitled "Safety in Radiation Therapy: A Call to Action." The meeting attracted 400 attendees, including medical physicists, radiation oncologists, medical dosimetrists, radiation therapists, hospital administrators, regulators, and representatives of equipment manufacturers. The meeting was co-hosted by 14 organizations in the United States and Canada. The meeting yielded 20 recommendations that provided a pathway to reducing errors and

- **Staffing levels**
- **FMEA**
- **Error reporting**
- **Accreditation**
- **Standardization**
- **Checklists**

ASTRO White Papers

Practical Radiation Oncology (2011) 1, 190–195
pro www.practicalradonc.org

Special Article

Safety considerations for IMRT: Executive summary

Jean M. Moran PhD[a,*], Melanie Dempsey MS[b], Avraham Eisbruch MD[a], Benedick A. Fraass PhD[c], James M. Galvin DSc[d], Geoffrey S. Ibbott PhD[e], Lawrence B. Marks MD[f]

[a]Department of Radiation Oncology, University of Michigan, Ann Arbor, Mich
[b]Department of Radiation Sciences, School of Allied Health Professions, Virginia Commonwealth University, Richmond, Virginia
[c]Department of Radiation Oncology, Cedars-Sinai Medical Center, Los Angel
[d]Department of Radiation Oncology, Thomas Jefferson University Hospital, P
[e]Radiation Physics, UT M.D. Anderson Cancer Center, Houston, Texas
[f]Department of Radiation Oncology, University of North Carolina, Chapel Hil

Received 19 April 2011; accepted 27 April 2011

- **Checklists / Time-outs**
- **Adequate time**
- **Training / credentialing**
- **Error reporting**
- **Accreditation**

10

ASRT White Paper

- **Staffing levels – min 2 / linac**
- **Training / credentialing**
- **Error reporting**
- **Accreditation**
- **Checklists / Time-outs**

11

Possible Result

- Multitude of accrediting entities, each defining their own QC/safety standards
- State regulations continue to reference Task Group reports, which may be inappropriate for some practice environments

12

Proposed Solution

- AAPM develops practice guidelines for medical physics, defining a minimum practice standard for a given scope of clinical service
- Accreditation programs (and state regulations?) incorporate the AAPM practice guidelines rather than defining their own

13

Medical Physics Practice Guidelines

AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE
PROFESSIONAL POLICY:
PROCESS FOR CREATION, APPROVAL, AND REVISION OF
MEDICAL PHYSICS PRACTICE GUIDELINES

INTRODUCTION

The American Association of Physicists in Medicine (AAPM) has long advocated a consistent level of medical physics practice, and has published many guidelines and position statements toward that goal, such as Science Council Task Group reports related to calibration and quality assurance, Education Council and Professional Council Task Group reports related to education, training, and peer review, and Board-approved Position Statements related to the scope of practice, physicist qualifications, and other aspects of medical physics practice. Despite these concerted and enduring efforts, the profession does not have a clear and concise statement of the acceptable practice guidelines for routine clinical medical physics. As accreditation of clinical practices becomes more common, Medical Physics Practice Guidelines (MPPGs) will be crucial to ensuring a consistent benchmark for accreditation programs.

The AAPM will lead the development of MPPGs in collaboration with other professional societies. The MPPGs will be freely available to the general public. Accrediting organizations, regulatory agencies and legislators will be encouraged to reference these

14

TG Reports vs MPPGs

TG reports are:

- Intended to be technical reference for medical physicists – compendia of the known science on a topic.
- Written by a core group of subject-matter experts
- Reviewed by subject-matter committee and approved by one Council

15

TG Reports vs. MPPGs

MPPGs are:

- Developed following a structured process to become consensus practice guidance documents
- Developed with cross-Council participation
- Open for review/comment by ALL members
- Intended to be adopted by regulatory agencies and accrediting entities
- Updated regularly – sunset dates / revision #
- Freely available to ALL – not just AAPM

16

MPPG Vision & Scope

2. Vision

The AAPM will lead the development of MPPGs in collaboration with other professional societies. The MPPGs will be freely available to the general public. Accrediting organizations, regulatory agencies and legislators will be encouraged to reference these MPPGs when defining their respective requirements.

3. Scope

MPPGs are intended to provide the medical community with a clear description of the minimum level of medical physics support that the AAPM would consider prudent in all clinical practice settings. Support includes but is not limited to staffing, equipment, machine access, and training. These MPPGs are not designed to replace extensive Task Group reports or review articles, but rather to describe the recommended minimum level of medical physics support for specific clinical services.

17

Old Blue Book, 1991

MINIMUM* PERSONNEL REQUIREMENTS FOR CLINICAL RADIATION THERAPY

Category	*Staffing*
Radiation Oncologist-in-Chief	One per program
Staff Radiation Oncologist	One additional for each 200–250 patients treated annually. No more than 25-30 patients under treatment by a single physician
Radiation Physicist	One per center for up to 400 patients annually. Additional in ratio of 1 per 400 patients treated annually
Treatment Planning Staff	
Dosimetrist or Physics Assistant	One per 300 patients treated annually
Physics Technologist (Mold Room)	One per 600 patients treated annually
Radiation Therapy Technologist	
Supervisor	One per center
Staff (Treatment)	2 per megavoltage unit up to 25 patients treated daily per unit 4 per megavoltage unit up to 50 patients treated daily per unit
Staff (Simulation)	2 for every 500 patients simulated annually
Staff (Brachytherapy)	As needed
Treatment Aid	As needed, usually one per 300–400 patients treated annually
Nurse**	One per center for up to 300 patients treated annually and an additional one per 300 patients treated annually
Social Worker	As needed to provide service
Dietitian	As needed to provide service
Physical Therapist	As needed to provide service
Maintenance Engineer/Electronics Technician	One per 2 megavoltage units or 1 megavoltage unit and a simulator if equipment serviced "in-house"

Red Book, 2009

2.5 Radiation Therapy Personnel

The process of radiation therapy consists of a series of steps and often involves a number of different individuals. Each practice should establish a staffing program consistent with patient care, administrative, research and other responsibilities. It is recognized that talent, training and work preferences may vary from individual to individual. It is appropriate to factor these aspects into the staffing program. General staffing recommendations are outlined in Table 3.

Table 3.
Staffing Per annual Number of New Patients, 8 hour per day, five days per week.

Personnel	
Radiation Oncologists	1 per 200 – 300
Medical Physicists	1 per 300 – 400, (25% IMRT)
Dosimetrists	1 per 200 – 250, (25% IMRT)
Nurses (RNs)	1 per 200 – 300
Radiation Therapists (RTTs)	1 per 100 – 150, (Minimum of 2), (25% IMRT)
Simulation Staff	1 per 200 – 250
Brachytherapy Staff	As needed
Clerical Staff	At least 1 per 200 patients
Treatment aides	As needed
Maintenance/Service Staff	By contract or 1 per 3 – 4 megavoltage units, CT, PET/CT or MRI units
Dietician	As needed
Physical or Rehabilitation Staff	As needed
Social Worker	As needed

ACR Staffing Levels

	ALL ACCREDITED FACILITIES	ACADEMIC / CCC	H1	H2	H3	F1	F2	F3
New patients/ radiation oncologist	199	171	261	208	129	267	227	152
New patients/ Physicist	271	180	267	269	216	369	315	303
New patients/ FTE dosimetrist	271	297	348	275	189	325	265	254
New patients/ FTE therapist	72	67	88	74	52	85	74	68
FTE therapist/ Rx machine	3.2	4	4	3.2	2.7	3.3	3.2	2.7
New patients/ Rx machines	218	263	306	233	132	268	234	128

American College of Radiology (ACR). Radiation oncology accreditation program requirements. Available: http://www/acr.org/~/media/ACR/Documents/Accreditation/RO/Requirements.pdf

19

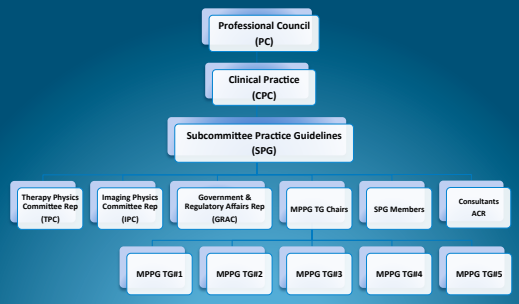
New "Blue Book", 2012

			Relative FTE Factor		Required FTE		Required Total FTE	
	Services -- # of Units or Licenses*	No. of systems*	Physicist	Dosimetrist	Physicist	Dosimetrist	Physicist	Dosimetrist
Equipment, Sources and Systems	Multi energy accelerators		0.25	0.05				
	Single energy accelerators		0.08	0.01				
	Tomotherapy, CyberKnife, GammaKnife		0.3	0.03				
	Cobalt Units, IMRT, PACS, EMR & Contouring		0.08	0.03				
	Orthovoltage and superficial units		0.02	0.01				
	Manual brachytherapy; LDR Seed Implants		0.2	0.03				
	HDR brachytherapy		0.2	0.02				
	Simulator, CT-Simulator, PET, MRI Fusion		0.05	0.02				
	Computer planning system (per 10 workstations)		0.05	0.02				
	HDR planning system		0.2	0.01				
						Subtotal		
No. Patients Procedures	Annual # of Patients undergoing Procedures**	No. of patients**						
	External Beam RT with 3D planning		0.0003	0.003				
	External Beam RT with conventional planning		0.0002	0.002				
	Sealed source Brachytherapy (LDR & HDR)		0.008	0.003				
	Unsealed source therapy		0.008	0.005				
	IMRT, IGRT, SRS, TBI, SBRT		0.008	0.005				
						Subtotal		
Nonclinical - Estimated Total FTE Effort	Estimated Total (Phys & Dosim) FTE Effort***	FTE Effort***						
	Education & Training (FTE)		0.667	0.333				
	Generation of Internal Reports (FTE)		0.667	0.333				
	Committees & Meetings; Inc. Rad. Safety (FTE)		0.667	0.333				
	Administration and Management (FTE)		0.667	0.333				
						Subtotal		
						Total		

"Safety Is No Accident", ASTRO intersociety collaboration, June 2012.

20

Structure of SPG



21

Current MPPG Task Groups

Diagnostic Imaging & Therapy

- MPPG TG#1: CT protocol management and review
- MPPG TG#2: Commissioning and QA of x-ray based image guided radiotherapy systems
- MPPG TG#3: The development, implementation, use and maintenance of Safety checklists for Radiation Oncology
- MPPG TG#4: Levels of supervision in clinical medical physics
- MPPG TG#5: Commissioning and QA of External beam treatment planning system dose calculations

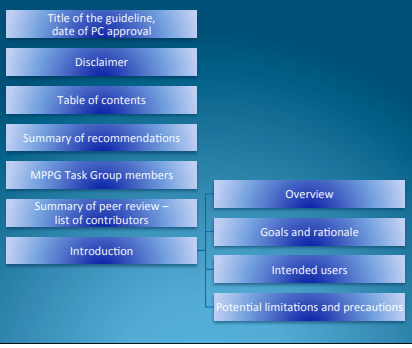
22

MPPG Development

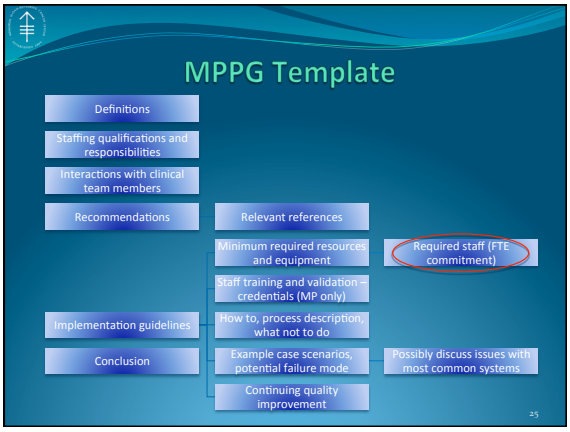
Scope	Review	Approval
• What • When • How • How often	• Peer review • Open comment • Summary	• Votes by SPG, CPC • Vote by PC • 5 yrs cycle

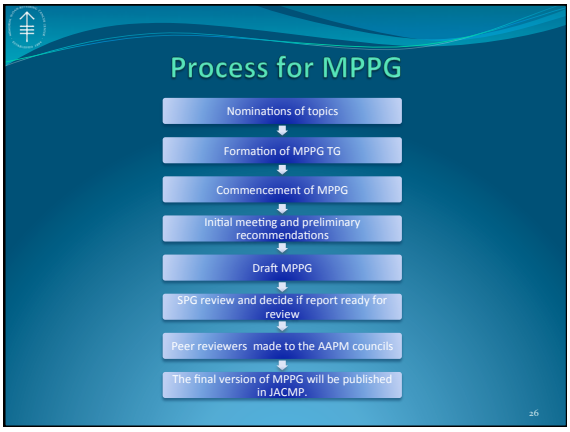
23

MPPG Template



24


MPPG Template
Definitions
Staffing qualifications and responsibilities
Interactions with clinical team members
Recommendations
Relevant references
Minimum required resources and equipment
Required staff (FTE commitment)
Staff training and validation – credentials (MP only)
Implementation guidelines
How to, process description, what not to do
Conclusion
Example case scenarios, potential failure mode
Possibly discuss issues with most common systems
Continuing quality improvement
25


Process for MPPG
Nominations of topics
Formation of MPPG TG
Commencement of MPPG
Initial meeting and preliminary recommendations
Draft MPPG
SPG review and decide if report ready for review
Peer reviewers made to the AAPM councils
The final version of MPPG will be published in JACMP.
26


Acknowledgements
Per Halvorsen
Lynne Fairobent
Daniel Pavord
Martin Fraser
and
All SPG Members