

## **Report of the Adhoc Committee on Alternative Pathways to Medical Physics Residency Training**

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## **Outline**

- Introduction
- Report of Committee
- Discussion

## **Scope of Practice of Medical Physics**

- The essential responsibility of the Qualified Medical Physicist's clinical practice is to assure the safe and effective delivery of radiation to achieve a diagnostic or therapeutic result as prescribed by a licensed practitioner in patient care.

## **Practice of Medical Physics**

- Radiation beam calibration and characterization
- equipment quality assurance and operations quality management;
- instrument and device specification
- acceptance testing and commissioning
- image quality assessment and optimization of imaging systems and processes

### Practice Cont'd

- shielding design and protection analysis on radiation-emitting equipment and radiopharmaceuticals;
- determination of dose delivered to patients and others exposed to radiation
- consultation and treatment planning with practitioners to determine dose to be delivered

### Practice Cont'd

- consultation with practitioners to assure accurate radiation dose to a specific patient
- and consultation intended to provide patient, staff, and /or general public radiation safety.
- .....

### Carrying Out Essential Mission

- REQUIRES:
- Thorough and proper training of all clinical medical physicists to achieve a high standard of safety and quality in patient care.

### IAEA Report - Medical Errors

- Medical Physicists are involved in for example:
  - Errors in calibration and commissioning
  - Improper use of instruments
  - Poor documentation/communication (process QA)
- Systematic or Patient Specific

IAEA Report - Lessons Learned from Accidental Exposures in Radiotherapy, 2000

## IAEA Report - Causes

- Inadequate Resources
  - Personnel, Equipment
- Inadequate Training
- Poor Communication/Documentation

### Patients exposed to high radiation levels

A machine's programming error caused the problem for 10 months.

Published April 1, 2005

An improperly installed machine exposed 77 patients with brain tumors and malformations to higher-than-prescribed radiation levels for nearly a year before the mistake was caught.

Federal inspectors detected the error on March 7, after 10 months during which the machine had been used. They determined that the machine, installed in May, gave patients radiation doses 1.5 times more powerful than prescribed amounts.

### Gamma Knife Miscalibrated

Service Engineer inadvertently changed source calibration date.

~ 2003

During a software upgrade the date of source calibration was changed (to something like 3 years prior)

No routine QA in place to catch this error. For months patients were treated with incorrect (and very high) doses.

### IMRT Dose Delivery Error

Substantial Patient Overdose

~ 2005

Information imported to treatment delivery system was incomplete/corrupt → IMRT MU used with ~open field

QA Process either not in place or not followed

**See Medical Errors and Medical Physics  
Tuesday at 1:30 for more information**

## Unqualified Medical Physicists

- Poor/erroneous advice given to physicians/others
- Poor or inadequate quality control and safety in medical practice
- HARM TO THE PATIENT
- Disgrace to our field.

## BUT

- Medical Physicists are well paid professionals
- HOW CAN THIS KEEP HAPPENING on OUR WATCH?????

## Proper Training and Experience!

- Too Many Medical Physicists Placed in Practice without Proper Training
- Safe and Effective Practice is our responsibility.
- QA documentation ....

## Poor Training/Preparation?

- Errors that Medical Physicists are responsible for keep happening
- ABR pass rates are ~50% for the entire exam
  - Even with cut scores set possibly too low.

## Established Models

- Physicians and many others we work with go through standardized education and training
- Requires (with each step being the prerequisite for the next)
  - Didactic Education – degree
  - Clinical Residency/Practicum
  - Certification

## Model Training/Qualifications

- Physics Degree
- Medical Physics - Didactic
- Clinical Training
- Board Certification

## Elements of Education and Training Clinical Medical Physicists

- Advanced degree in
  - Medical Physics
  - Physics or
  - Physical Science ...

## Elements of Education and Training Clinical Medical Physicists

- Satisfactory completion of required core didactic medical physics coursework
  - outlined in AAPM report 79 (2002) and
  - can be accomplished either during the degree or clinical training component of the training and education process.

## Report 79 – Graduate Programs

- core curriculum
  - that all medical physics Masters (M.S.) and Doctoral (Ph.D.) trainees should be well grounded in .....
  - serves as a basis for
- Imaging Science and Radiation Therapy subspecialization

### ACADEMIC PROGRAM RECOMMENDATIONS FOR GRADUATE DEGREES IN MEDICAL PHYSICS – AAPM Report 79 – Paliwal et. al. 2002

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## Elements of Education and Training Clinical Medical Physicists

- Extensive clinical medical physics training
  - Outlined in AAPM Report #36 and
  - Delivered in a CAMPEP accredited clinical training program

Sternick et. al. – Under Revision 2004-5

### Essentials and Guidelines For Hospital Based Medical Physics Residency Training Programs

A Report of the  
AAPM Presidential Ad Hoc Committee  
on  
The Clinical Training of Radiological Physicists

Revised and Approved July 1990

Published for the  
American Association of Physicists in Medicine  
by the American Institute of Physics

## Structured Training

- Report 36 and its successor outline specific and complete structured clinical training programs
- Properly prepare an individual for competent clinical practice in medical physics.

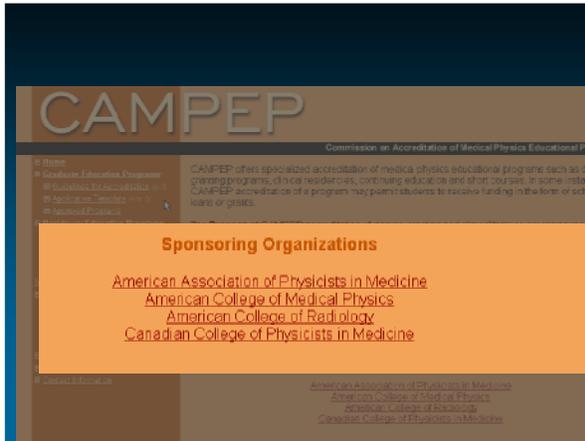
## How Do We Know?

- That any program actually delivers what is listed in Report 79 and Report 36??

The screenshot shows the homepage of the Commission on Accreditation of Medical Physics Educational Programs (CAMPEP). At the top, the URL **WWW.CAMPEP.org** is displayed in yellow. Below it, the word **CAMPEP** is written in large, white, serif font on a dark background. Underneath, the full name of the organization is written in a smaller font: **Commission on Accreditation of Medical Physics Educational Programs**. The page is divided into two main sections. On the left is a navigation menu with links such as Home, Graduate Education Programs, and Accredited Programs. On the right, under the heading **ABOUT CAMPEP**, there is a paragraph defining accreditation as a voluntary, non-governmental process of peer review. It also mentions that accreditation serves as public recognition and provides a quality standard for education. The text further explains that accreditation is sometimes confused with certification and that CAMPEP offers specialized accreditation for medical physics educational programs like degree-granting programs and clinical residencies.

## CAMPEP Accreditation

- Commission on Accreditation of Medical Physics Education Programs
- Purpose - Review and Accredit
- Accreditation is to ensure that a program has met a defined standard and serves as public recognition that a program provides a quality training



## Education, Training + Certification

- Consistent with the AAPM definition of a Qualified Medical Physicist:
- Certification by the ABR or equivalent is evidence of the minimum education and training necessary for practicing clinical medical physicists.

## The 3 Tier Approach Works!

- As reported in the April 2005 Medical Physics Point Counter-Point by Amols and Herman:
- Graduates of CAMPEP accredited residency programs fully pass the ABR on the first attempt at a **95%** rate, as compared to the overall ABR average pass rate of **53%**.

## Linking Training and Certification ABR 2012

- The ABR trustees in a 2003 newsletter suggested that graduation from a CAMPEP accredited clinical training program should be considered a requirement to sit for the ABR exams by 2012
  - As it is for our physician colleagues

## BUT: Demand >> Supply

- At present, the demand for qualified medical physicists far exceeds the supply of individuals graduating from existing CAMPEP accredited residency programs
- Currently 10 Therapy and 1 Imaging residency programs accredited
  - with another 6+ under consideration

## Demand >> Supply

- 250 new medical physicist positions per year are anticipated:
  - Based on the number of advertised positions and of expected new facilities
- If each program graduates 3 residents per year we would require 75+ accredited training programs to meet demand.

## Dilemma

- In order to answer these questions and address these issues AAPM President Howard Amols created an Ad Hoc committee:
- "Ad Hoc Committee on Alternative Paths to Medical Physics Residency Training" or AHCAPMPRT

## Committee Charge

- ABR is considering requiring graduation from a CAMPEP approved program as a requirement for sitting for the boards by the year 2012.
- As the number of CAMPEP approved residency programs is limited, and it is not clear that these programs will be able to fulfill the need for medical physicists....

## Charge Continued

- ....., this committee is charged with exploring the possibilities of alternative routes to training. Specifically, this committee will make recommendations to the AAPM BOD on whether the AAPM should officially support alternate mechanisms for training, if so what the requirements for such training should be.

## Committee Members

Larry Reinstein, Chair  
Michael Herman  
Eric Klein  
John Hazle  
Larry Rothenberg  
Kenneth Hogstrom

## Committee Recommendation that AAPM BOD make Policy:

"The AAPM supports a formal requirement for thorough and proper training of all clinical medical physicists in order to achieve a high standard of safety and quality patient care. AAPM maintains that the proper path for the education and training of clinical medical physicists includes three essential components:

## BOD Action Cont'd

1. An advanced degree in Medical Physics, Physics, or Physical Science,
2. Extensive clinical medical physics training as outlined in AAPM report #36 and delivered in a CAMPEP accredited clinical training program and
3. Satisfactory completion of required core didactic medical physics coursework as outlined in AAPM report 79 (2002) and which can be accomplished in either the first or second component of the training process.

## BOD Action Cont'd

Consistent with its definition of a Qualified Medical Physicist the AAPM believes that Certification by the ABR or equivalent is evidence of the minimum education and training necessary for practicing clinical medical physicists. In addition, the AAPM supports the long term goal that the three-point pathway specified above be considered by the ABR and other Boards as *necessary* for eligibility to achieve certification in medical physics.

## BOD Action Cont'd

Recognizing that at present the number of CAMPEP accredited clinical training programs is insufficient to meet this goal, the AAPM encourages the establishment of additional accredited training programs and urges CAMPEP to develop guidelines and standards which enable the expansion of these CAMPEP accredited programs through the establishment of affiliated clinical training sites incorporating structured mentorships".

## Committee Position

- Education in Physics and Medical Physics as well as completion of a structured clinical training program is essential for individuals who will be involved in the practice of clinical medical physics.

## Committee Position

- A structured clinical training program, such as a CAMPEP accredited medical physics residency provides a superior mechanism for physicists to acquire extensive and varied clinical experience from experienced mentors in a supervised environment.

## Recalling the Issues

- Supply of properly trained and qualified individuals can not meet demand under any standard 3 tier model:
- Graduate Degree +
- CAMPEP Accredited report 79 training +
- CAMPEP Accredited report 36 training +
- Board Certification

## AND

- The establishment of a CAMPEP accredited residency program is a *significant undertaking*
  - requires a substantial infrastructure including space, equipment, administrative and clerical personnel, faculty, staff, and hospital or medical school support.

## AND

- Should we require CAMPEP accredited graduate degree as prerequisite for entering residency?
  - Further restricts the supply?

## Thus

- Given the magnitude of the undertaking it seems unlikely that such a large number of new residency programs will be established and accredited in time to alleviate this shortage.
- **The Committee recommends that AAPM urgently request that CAMPEP devise guidelines for an alternative, formally structured training mechanism to help assure that an adequate supply of competent clinical medical physicists will be available**

### Specifically to Meet Demand

- The Committee recommends that AAPM encourage the establishment of additional accredited training programs and
- Urges CAMPEP to develop guidelines and standards which enable the expansion of these CAMPEP accredited programs through the establishment of affiliated clinical training sites incorporating structured mentorships

### Consistency Essential

- The Committee believes that it is important that a medical physicist who is trained under an alternative CAMPEP accredited training mechanism receives the same quality training and is subject to the same high standards established by CAMPEP guidelines.

### Assure Consistency

- CAMPEP develops guidelines which create a category of satellite training facilities which are affiliated with the principal accredited residency institutions.
- The principal residency institution provides
  - much of the infrastructure and
  - direct oversight for the satellite training program.

### Assure Consistency cont'd

- A medical physics trainee at such a satellite would work within a structured mentorship with an approved mentor and program at the satellite institution.
- The mentor is subject to review within the principal institution's training program.

### Benefits of Principal/Satellite Relationship

- Specialized equipment or procedures available at the satellite or principal (and unavailable at the other)
  - can expand the training experience of the residents at both institutions.
  - The principal institution may offer organized required didactic medical physics coursework as outlined in AAPM report 79 (2002).

### Benefits

- Patients benefit from the highest quality medical physics support
- It can be achieved within the existing system/structure

### Report Status

- Under review by educational council (Mower)
- Under review by Education and Training of Medical Physicists committee (Podgorsak)
- Intention is to be brought to AAPM board for approval

### Questions/Discussion