Rethinking Medical Physicist educational models in light of 2012 and 2014 Manpower needs in Medical Physics:
Is it time to end the MS in Medical Physics?
Michael D. Mills

MEDICAL PHYSICS WORKFORCE ISSUES IN THE USA

ACMP ANNUAL MEETING CHATTANOOGA, TN

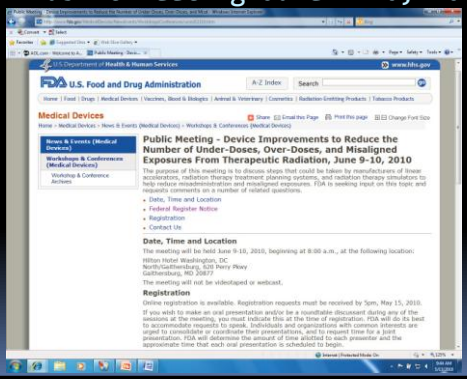
Louisville, Kentucky!

List of Topics

- Complexity, Safety and Quality Assurance
- Where is the QA Knowledge?
- Staffing Models
- Updated Demand and Supply Models
- CAMPEP Accreditation for Residency Programs
- Future Educational Models

Complexity, Safety and Quality Assurance

FDA Public Meeting June 9-10, 2010



What Questions for Comment are being asked by the FDA?

- Categories of Questions:
  - Device Improvements and Reporting
  - User Training
  - Quality Assurance Measures

Device Improvements and Reporting

- Describe issues with misadministrations and your suggestions to address the safety issues.
- Are there any hardware and software features that manufacturers can build into radiation therapy devices to reduce underexposures, overexposures, or misaligned exposures to ionizing radiation during radiation therapy?
- What techniques do you recommend for improving therapists attention?

Device Improvements and Reporting

- What is the context and what does the FDA want?
  - Context - The FDA was embarrassed by the injury of patients by therapy and diagnostic equipment that had cleared the FDA approval process
  - The FDA wants safety features built into equipment
  - The FDA wants better training by manufacturers
  - The FDA wants better imaging & treatment processes
  - The FDA wants to know when the equipment does not perform properly, even if the patient is not injured

User Training

- Should Manufacturers provide training to ensure equipment users have adequate understanding of equipment capabilities, operating principles for the technology, general information about patient dose, and specific dose-related equipment features? What training should be provided?
- If Manufacturers provide such training, which personnel should receive it?

User Training

- What is the context and what does the FDA want?
  - Context - The root cause of some patient injuries was that trained professionals did not understand some of the equipment safety and performance issues.
  - The FDA wants the manufacturers to assume the responsibility for training personnel in the safe use of their equipment
  - The FDA wants all personnel in the imaging/therapy process to be trained
  - The FDA wants all personnel to demonstrate maintenance of competency for imaging/therapy processes
  - The FDA wants better software design and testing

Quality Assurance Measures

- Is there a model QA program that exists which is widely accepted? If so, please describe.
- What types of QA should be the responsibility of the facility, the physicist, the operator, others?
- Should manufacturers provide QA procedures to medical facilities and users of radiation therapy devices? If so, why, and what instructions should be provided? If not, why not? How extensive should they be?

Quality Assurance Measures

- What is the context and what does the FDA want?
  - Context - The FDA thinks its current device approval process allows new technology to be disseminated without adequate QA standards and processes
  - The FDA wants Model Programs
  - The FDA wants clear lines of responsibility
  - The FDA wants manufacturers to assume responsibility for equipment QA processes
  - The FDA wants manufacturers to improve their quality of QA training

Where is the QA Knowledge?

Where is the QA Knowledge?

Safety and QA: Where should it be taught?

- Safety and QA is Device, Manufacturer and Procedure Specific
- Safety and QA involves Ongoing Training to Maintain Competency
- Safety and QA involves the development of Model QA Programs with clear operational lines of responsibility
- Safety and QA must be taught in a Residency Program and it must be a primary feature

How should the Medical Physics Community Respond?

- One possible response could be a functioning proof of concept web site providing peer review of training, commissioning, QA and special procedures documents
- These documents could be used as a component of practice and residency program accreditation
- Open source software (Linux, PKP scripting language, MySQL database, Public Knowledge Project application) will be the peer-review platform for these documents

Staffing Models

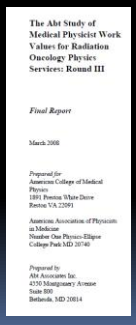
Sources and Initiatives for US Staffing Recommendations in Radiation Oncology

- Revision of CROS Blue Book
- International Atomic Energy Agency
- ASTRO – ACR Database
- ABT II and ABT III Reports
- AAMD Workforce Study (in progress)
- Canadian Workforce Study

Where is the Staffing Data?

ASTRO
American Society for Therapeutic Radiology and Oncology

ACR
American College of Radiology


The Abt Study of Medical Physicist Work Values for Radiation Oncology Physics Services: Round III

Final Report

March 2008

Prepared for
American College of Medical Physics
1891 Preston White Drive
Reston VA 22091

American Association of Physicists in Medicine
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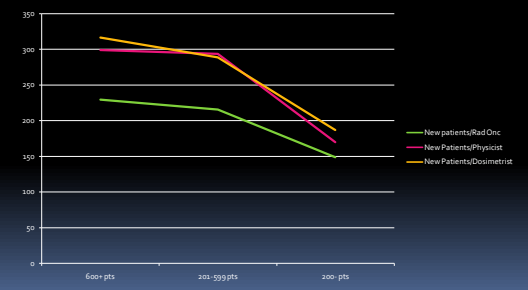
What does the ASTRO – ACR Database and Abt Report Reveal?

- Practice venue largely does not matter
- Community based centers, Freestanding centers and University centers require similar staffing
- The only variable that affects staffing is the number of patients treated in the facility on an annual basis
- These are reported for facilities treating > 600, 200-600 and < 200 patients annually

What does the ASTRO – ACR Database and Abt Report Reveal?

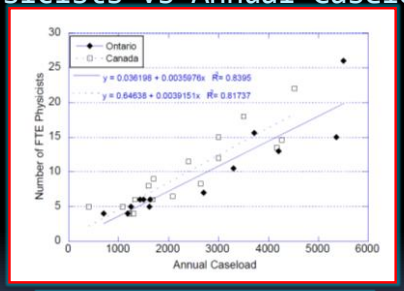


How can we use the Abt III Report?

How can we use the Abt III Report?

- The Abt III survey establishes the work performed by the qualified radiation oncology physicist
- The Abt III survey allows the QMP to argue for staffing, quantity of work and compensation
- The Abt Associates report empowers the medical physicist to negotiate from a middle ground for compensation - between direct billing and a non-professional salary
- We can use the data in Abt III to negotiate with employers in the same manner that Physicians negotiate with CMS – by using the time and work required to deliver patient procedures

Physicists vs Annual Caseload



Inverse slope:
Ontario: 278 treated cases/physicist
Canada: 255 treated cases/physicist

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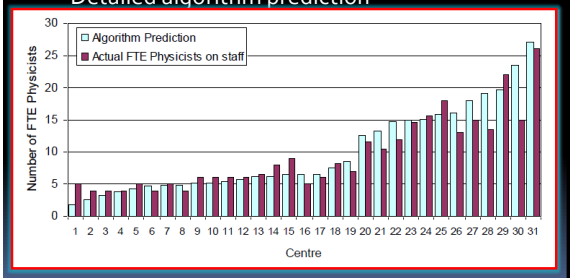
Algorithm Predictive Power

Canadian Survey

- Detailed algorithm prediction



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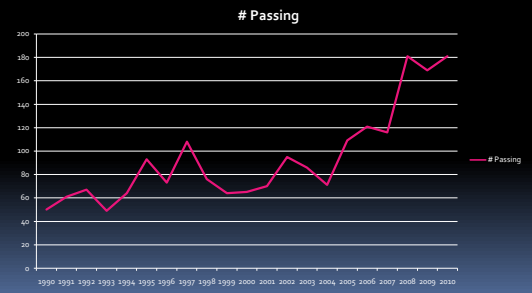
Updated Demand and Supply Models

How many patients annually per Qualified Medical Physicist

- Abt I 1995 421
- Abt II 2003 325
- Abt III 2008 304

When was the big Demand?

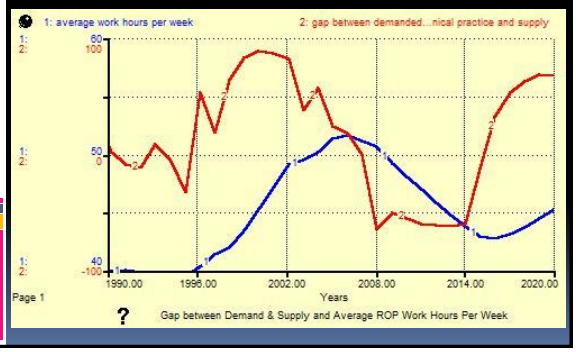
How many therapy physicists pass the ABR in TRP by year?



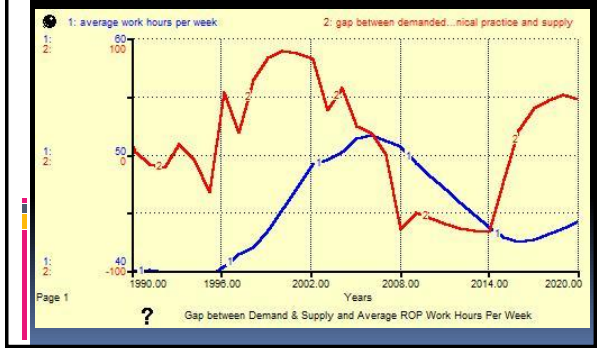
Projected ABR TRPs through 2020

2020–If we graduate 100 TRPs

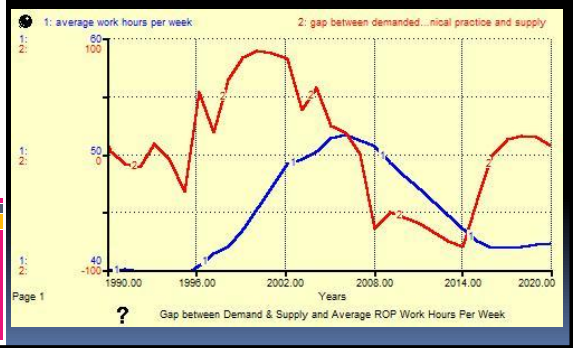
2020–If we graduate 125 TRPs



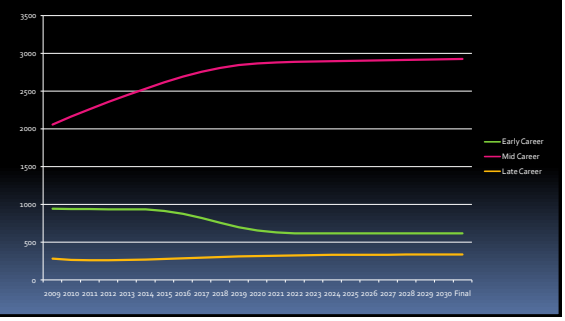
2020–If we graduate 150 TRPs



2020–If we graduate 200 TRPs

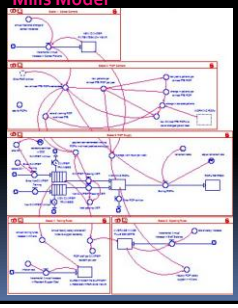


SUNY Albany Workforce Study Therapy Physicists

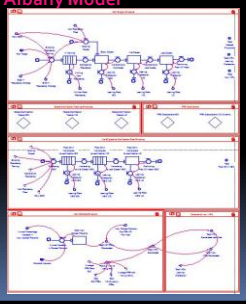


Stella Models

Mills Model



Albany Model



How many physicists must we train?

- Current number of CAMPEP Residents must increase from 40 to a minimum of 125 per year by 2020; 100 will not work!
- A more comfortable number would be 150; 200 would balance supply and demand
- If we are unable to make enough TRPs:
  - Will more medical physicists retire or leave the profession?
  - Will this impact safety and quality assurance?
  - Will this impact patient care negatively?

CAMPEP Accreditation for Residency Programs

Structure within the Hospital or Medical Center

- The institution sponsoring the program of clinical training in radiation oncology physics should provide administrative support in terms of budget and space in addition to clinical and educational resources
- Adequate conference room and audiovisual facilities should be provided
- Commitment to long-term funding of the program is essential

Structure within the Hospital or Medical Center

- Who owns and/or provides the equipment?
- Who employs the physicists and residents?
- To whom does the program report administratively?
- What other associated training programs exist at this facility?
- What internal oversight mechanisms are present?

Role of the Program Director

- The program director is responsible for the whole of the radiation oncology physics training program. The program director:
  - (1) Must contribute sufficient time to the program to ensure adequate direction
  - (2) Is responsible for program organization and direction as well as instruction and supervision of physics residents
  - (3) Must arrange for the provision of adequate facilities, teaching staff, clinical resources, and educational resources
  - (4) Is responsible for the recruitment and appointment of physics residents and must ensure that the appointed residents meet the eligibility requirements
  - (5) Is responsible for ensuring the resident is making satisfactory progress, and for providing appropriate disciplinary action should this not be the case

Role of the Program Director

- The qualifications of the program director are as follows:
- (1) Must be certified in radiation oncology physics by an appropriate certifying board
- (2) Must have at least 7 years of full-time experience as a qualified medical physicist practicing in radiation oncology physics
- (3) Must be a full-time staff member, qualified in and practicing radiation oncology physics at the training facility.

Committees and Meetings

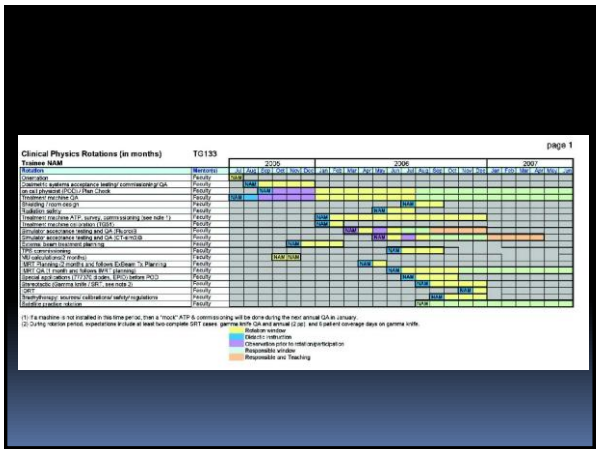
- Physics Residency Committee
  - Resident recruitment
  - Admission recommendations
  - Monitor physics resident's progress
  - Training curriculum
  - Orientation program
  - Committee meetings
  - Oral and written exams
  - Program review
- Internal Review Committee
  - Made up of appropriate individuals qualified to review the program
  - Meets periodically – once every 3-5 years

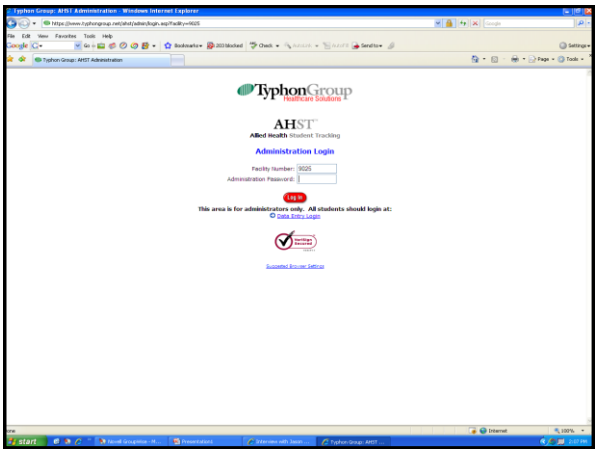
Records Available for Review

- Conferences – not graded, attendance and/or participation required
- Competencies – graded when performed
- Coursework:
  - Short courses without grades
  - Short courses with grades
  - Traditional courses with tests and a final examination
  - Non-traditional courses without testing
  - On-line training
  - Vendor training

Complexity

- A competency may be associated with a course
- A competency may be associated with a conference
- A course may be associated with a conference
- Any of these may be associated with specific mentors, patients, or machines
- Each event type, the associations, the mentors, the patients and the equipment must be captured on an ongoing basis to provide proper documentation for a residency program
- This is an onerous task!





Future Educational Models

MS Medical Physicists accepted to CAMPEP Residency Programs

- Accepted:
  - **********
- Not Accepted
  - **********
    ****
    ****
    ****
    ****
    ****
    ****
    ****
    ****
    ****

PhD Medical Physicists accepted to CAMPEP Residency Programs

- Accepted
  - **********
    ****
    ****
    ****
- Not Accepted
  - **********
    ****

Summary and Conclusions

- Safety and Quality Assurance is the single biggest issue for the radiation oncology industry and the single biggest issue in medical physics education
- Safety and Quality Assurance can only be taught in a CAMPEP Residency Program
- Some CAMPEP PhD graduates and most MS graduates cannot enter residency programs and therefore cannot enter the profession as of 2014
- There is currently a huge over supply of ABR TMPs and medical physicists in academic programs
- Is it time to eliminate the MS in Medical Physics in favor of the PDMP?

Summary and Conclusions

- YES
- Two years graduate academic training plus two years training in a clinical residency is a Professional Doctorate
- Examples are Physicians, Dentists, Podiatrists, Pharmacologists and Optometrists
- Medical Physics must credential its professionals accurately as Professional Doctorates in Medical Physics (DMP) to compete for scholars that would otherwise choose other professions

Summary and Conclusions

- Continuing to award the MS Degree in Medical Physics without guaranteeing entry into an appropriate residency program is a catastrophic disservice to our students and our profession
- The student will not be able to enter the Medical Physics profession – and that is a good thing because the safety and quality assurance training can only be taught in a CAMPEP Residency Program

Summary and Conclusions

- Some Universities will not allow MS programs to transition to DMP programs for various reasons
- Any MS program that provides a minimum number of residency slots for their graduates should be evaluated by CAMPEP as a DMP program
- MS programs should aggressively seek agreements with existing residency and distributed residency programs to provide slots for all of their graduates

Summary and Conclusions

- Proposed guidelines for CAMPEP
  - An academic program should provide residency slots for their graduates equivalent to 25% of each year's graduating class within the University System
  - An academic program should have signed contracts with standalone residency programs to locate 50% of their graduates
  - An academic program should have a history of locating 75% of their graduates in residencies over the past three years before evaluation for re-accreditation
- Failure to achieve these numbers will result in probation and eventual revocation of CAMPEP accreditation!

Summary and Conclusions

- Why should CAMPEP name a MS program with residencies a DMP? – To emphasize that only a combination of a CAMPEP academic MS and a residency should be considered for accreditation.
- CAMPEP does not specify the business model in the accreditation process except to determine that you have one and the program does not lose money
- It is more efficient and less costly to accredit both an academic and residency portion in a single site visit
- Over time, competition for students will leverage institutions to rename the MS + residency experience a professional doctorate

Summary and Conclusions

- What about the argument that no school "guarantees" entry into a profession and our savvy students know this when they apply?
- Does that mean we will only get students with no savvy?
- Also, what about all the employment alternatives for MSMP graduates?
- No one is ever guaranteed a job, but just ask the students! They do not want to work in industry or academics or as a medical dosimetrist!
- It is not ethical for highly successful students to be denied the opportunity to take the ABR Certification examinations because we mismanaged the educational process

Summary and Conclusions

- What about the argument that the DMP will kill the driving force behind the success of medical physics as a profession that in turn supports the success of radiology and radiation oncology?
- The key will be to make medical physics research attractive to that subset of clever and creative physicists that drive the profession.
- Today, there is no question we are seeing some very smart and compelling individuals that want to enter our field, but are current academic accomplishments and high GRE scores the right measure of a lifetime of curiosity and creative achievement?

Summary and Conclusions

- I therefore urge the immediate elimination of the CAMPEP accreditation process for all MSMP programs to be replaced by PDMP programs
- CAMPEP should immediately accredit only PDMP, Residency and PhD programs, and immediately set a date beyond which MSMP programs with no residency positions will no longer be re-accredited
- Those that advocate continuing the MS in Medical Physics must consider the immediate and irreparable harm that is being done to our profession, our graduates and our patients

Summary and Conclusions

- What will happen in the long run is that the academic portion of our training will expand to 3-4 years including clinical rotations, subfield specialization rotations and a 6 month clinical research project.
- Residency programs will likely expand from 2 to 3 years. The complexity of our field, the range of instrumentation and safety for our patients will require this

Summary and Conclusions

- Our profession is looking more like the medical school model, and our compensation is similar to many medical school graduates
- Something like the medical school expense and business model may also become our future
- Unfortunately this will mean our students will need to take out loans for the academic portion of their training, but they should expect to be paid for the residency portion at a level similar to medical residents

Thank You!