

MP 3.0 - Medical Physics Education: Overview of Challenges and Future Potential

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Outline

- 1) Motivation driving MP 3.0 in education**
- 2) MP3.0 Educational Goals**
- 3) Current challenges in medical physics education**
- 4) Who is already tackling the future of MP education?**
- 5) Examples of current initiatives**
- 6) Potential future initiatives, idealistic ideas**

Motivation for MP3.0 in Education

1) It's who we are:

- *"Research and being the scientist in the room is what sets us apart and has allowed medical physics to grow"*
- *"Physicists should be the vectors for translation of scientific fundamentals towards improving operations in the healthcare environment"*
- *"We are not just service providers"*

Motivation for MP3.0 in Education

1) It's who we are: Professional pride and ethical duty:

- Ensure a high level of knowledge and skills is achieved to benefit patient care and safety
- Continue contributing to improvements in patient care by keeping pace with evolving scientific knowledge
- Promote excellence in training of our future colleagues in appreciation for those who trained us

Motivation for MP3.0 in Education

2) Sustainability and growth of the profession

- *“Historically being a technician was enough but it won’t be enough to sustain the profession in the future”*
- **Financial pressures in healthcare**
 - ✧ Bundling of cost in reimbursements
 - ✧ Technology care can be commoditized and handed off to lower paid salaried professionals
 - ✧ Not enough to communicate our value → Administrators will still cut

Aim to expand into new territory rather than being on the defensive

MP 3.0 Education Goals

Goal: *Balance the needs of clinical specialization, accreditation, and certification with the need to be broad and future reaching as true leaders and “scientists in the room” in healthcare.*

- 1. Need efficiency and effectiveness in Education**
- 2. Need expansion of educational opportunities to diversify the MP workforce**
- 3. Need improved integration with other healthcare decision makers**

Challenges

- 1. What we are teaching**
- 2. How we are teaching**

Challenges in MP Education

1. What we are teaching: Is CAMPEP curriculum enough?

- 48% of participants matched to a residency in 2017
- **SDAMPP survey (2015-2016) found that**
 - ✧ 30% of match applicants would not have applied to medical physics if they had known likelihood of getting into residency was so low
 - ✧ >50% of directors believe this will affect quality of applicant pool
- **Working Group to Promote Non-Clinical Career Paths (2015):**
 - ✧ Over 60% of students did not feel knowledgeable about other options
 - ✧ 55% of program directors think AAPM/CAMPEP has responsibility to prepare students for non-clinical careers

Challenges in MP Education

1. What we are teaching: Is CAMPEP curriculum enough?

- **Looking to the past:**
 - ✧ Fear loss of strong fundamental physics & deep scientific competencies
 - ✧ No infusion of new ideas
- **Looking to the present:**
 - ✧ Clinical versatility: strong in both radiation therapy and imaging
- **Looking to future:**
 - ✧ Immunotherapy, cancer & molecular biology, biostatistics, neuroscience
 - ✧ Computer science, big data and machine learning, virtual reality
 - ✧ Systems and process engineering, safety engineering
 - ✧ Leadership skills, business classes

Challenges in MP Education

2. How we are teaching: Students aren't getting it

There's a large gap between natural aptitude and competency

Natural **aptitudes** are the tools in your toolbox but **competency** is knowing how to use the toolbox to achieve good results.

- ✧ There has been overemphasis on passing exams and not on gaining competencies
- ✧ Can execute tasks but can't explain the why
- ✧ Can't problem solve or improvise in new situations

Lecture only format is not effective

Who is tackling these challenges?



AAPM Committees for education & training

Education Council, Science Council, and Professional Council

■ Improving Education

- ✧ Committee on Medical Physicists as Educators
- ✧ Working Group on Medical Physics Graduate Education Program Curriculum

■ Improving Workforce diversity

- ✧ Working Group to Promote Non-Clinical Career Paths for Medical Physicists
- ✧ Task Group 298: Alternative Pathway Candidate Education and Training

■ Improving Professionalism training

- ✧ Medical Physics Leadership Academy Working Group (TG 295, TG296, TG297)
- ✧ Continuing Professional Development

■ Improving Research training

- ✧ Working Group on Student and Trainee Research
- ✧ Task Group 278: Combined Residency and Research Training in Medical Physics
- ✧ Working Group on Future Research and Academic Medical Physics

Who is tackling these challenges?

Educational Council: How we are teaching

Committee on Medical Physicists as Educators

1. Wiki page (<http://wikifull.aapm.org/index.php/MPESC>)
 - Educator resources
 - Teaching models and practices
 - Innovations in Medical Physics Education session
 - **2016 Education Council Symposium**
 1. Implementing project-based and flipped learning
 2. Incorporating active learning
2. 2018 Education Workshop: “Becoming a better medical physics teacher”

Who is tackling these challenges?

AAPM RPT249 (2013): Essential Guidelines for Clinical Medical Physics Residency Training Programs

- Leadership training, professional liability
- Administration (staffing models, budgeting, and billing)
- Develop knowledge of capital equipment procurement process (business plans, tender documents)
- Partnering with managers and providers to assess, coordinate, and improve health care
- Assimilate scientific evidence to improve patient care
- Apply radiation biology and epidemiology to clinical situations

Challenges in MP Residency

How we are teaching

Time pressure - Treat residents as cheap labour and work horses of the dept.

1. Survival mode, take short cuts, train bad habits, make it pass mentality
2. No time to analyze the reason for the test
3. Training technicians rather than scientist.
4. Overemphasis on machines and technology, not on patient care

Time pressure - Push aside residents and do the work themselves

1. Lack problem solving opportunities/experience

Challenges in MP Residency

How we are teaching

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Time pressure - Push aside residents and do the work

1. Lack problem solving opportunities/experience

**Teaching self-segregation and isolation
from clinical decision making**

Example Educational Initiatives

Increased clinical integration during residency training

■ Med Phys and RO residents:

- ✧ Share same office space
- ✧ Present at same clinical case conference (reverse roles)
- ✧ Elective international residency rotation (Africa, Asia, Central America)
 - 1) RO and physics travel together, foster multi-disciplinary working relationships
 - 2) Improves problem solving, deal with limited resources
 - 3) Fosters interest in caring for underserved populations and global health

■ Physics patient consult:

- ✧ Formal training on patient interaction and communication
- ✧ Simulated scenarios

Example Educational Initiatives

Professionalism and administrative training

- 1) Chair of department leads classes on the business of radiation oncology
- 2) Chief of physics leads sessions on reviewing papers, ethics, applying for jobs, real life situations
- 3) Agreement with business school where graduates can take classes
- 4) Administrators could get teaching credit to enhance their resume:
 - Run simulations and case studies
 - Critique physicist's business case and briefing notes for projects

Example Educational Initiatives

Expanding the field of medical physics

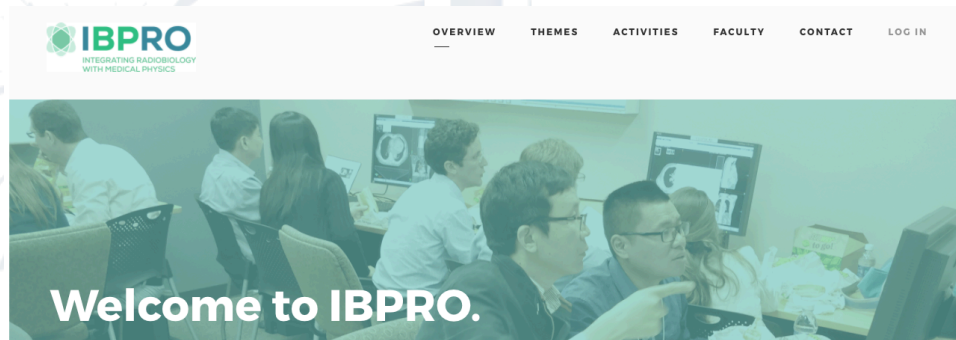
1. Integrated Biology and Physics of Radiation Oncology
2. Medical Physics and Statistical Science – Exploring Interfaces and Building Collaborations
3. Rapid Research Rounds

Example Educational Initiatives

Expanding the field of medical physics

1. Integrated Biology and Physics of Radiation Oncology

- Wayne State University
- Funded by NIH/NCI R25 grant
- Unique emphasis on education and fostering multi-disciplinary collaboration
- Med phys, rad bio, clinical oncology
- Virtual hospital, protocol development, breakout sessions



An Integrated Course in the Biology and Physics of Radiation Oncology

Example Educational Initiatives

Expanding the field of medical physics

2. Medical Physics and Statistical Science – Exploring Interfaces and Building Collaborations

- Reduce cost of clinical trials
- Methods to shorten new patient recruitment
- Quantify direct & indirect costs of misdiagnosis and mistreatments
- Statistical process control to improve RT
- Implementing new technology and maintaining patient safety

Medical Physics and Statistical Science

Exploring Interfaces and Building Collaborations

Field Institute, April 4-5, 2017

Sponsored by: Canadian Statistical Sciences Institute & Canadian Organization of Medical Physicists and the Universities of Toronto and British Columbia




Future funding Banff International Research Station?

Example Educational Initiatives

Expanding the field of medical physics

3. Rapid Research Rounds

- 3-4 min, 1 slide, judges and prizes
- Med physics, nutrition oncology, cancer immunology
- Future:
 - ✧ Cancer Control Research
 - ✧ Experimental Therapeutics
 - ✧ Molecular Oncology
 - ✧ Genomic Sciences Centre
 - ✧ Integrative Oncology (radiation biology, imaging, genetics)



BC Cancer Agency
CARE + RESEARCH
An agency of the Provincial Health Services Authority

VIC Rapid Research Rounds

High impact research condensed into only
three minutes and one slide

When: Thursday, July 6, 2017 at noon
Where: VICC Conference Room 2&3
All VIC staff welcome

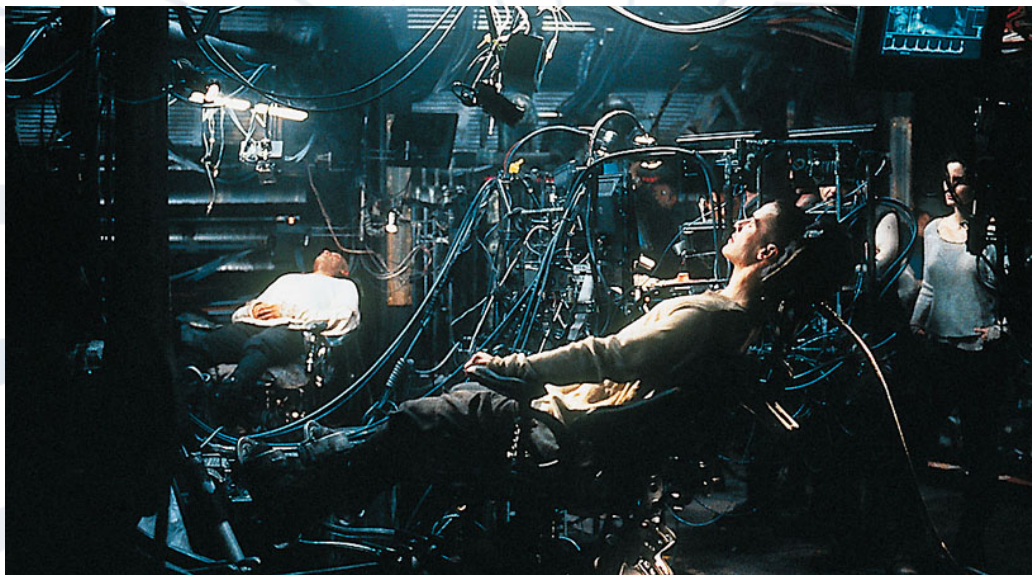
Join us for lunch and a look at research taking place right
here at BCCA-VIC.

*Pizza lunch provided for audience
First place and Audience Choice prizes will be awarded!

Researchers presenting from:
Clinical Research • Deeley Centre • Medical Physics & more!

Potential Future Initiatives & Idealistic Ideas

How to elevate everyone in the next 5 years?



Potential Future Initiatives & Idealistic Ideas

How to elevate everyone in the next 5 years?

1) Modernize AAPM technology services

We are very behind on technology as a communication tool!

- a) Organization of content
- b) Delivery of content

2) Invest in AAPM Volunteer Services

- a) Underutilizing our membership resources
- b) Accelerate development of leadership pool

Potential Future Initiatives & Idealistic Ideas

1) Modernize AAPM technology services

a) Organization of Content

- Invest in the dissemination of knowledge

You don't know what you don't know

- ✧ Virtual library: tag with keywords
- ✧ Simulated education tools (wiki page hard to find)
- ✧ Miscellaneous thrown into links of interest

- Google analytics

- ✧ Understand traffic flow, #users/page, flow of clicks
- ✧ Want better usability, strong desire for education,

Potential Future Initiatives & Idealistic Ideas

1) Modernize AAPM technology services

b) Delivery of Content

- **YouTube channel of “How To Videos”**

- ✧ E.g. Water tank leveling, Patient immobilization

- **Develop Apps: e.g. Radiobiology, FMEA**

- ✧ Outsource: e.g. UK, US, Canada, Australia, Phillipines, Ukraine

- Design: 99designs.ca, designcrowd.ca

- Coding: Freelancer.com, upwork.com

- Miscellaneous: <https://www.fiverr.com/> (e.g. Video & Animation, Infographics)

Potential Future Initiatives & Idealistic Ideas

2) Invest in AAPM volunteer services

- **Hire a volunteer coordinator**
 - ✧ Actually answer emails
 - ✧ Identify needs and design volunteer roles
 - ✧ Triage help requests
 - ✧ Match volunteers to their strengths
 - ✧ Build local mentorships
 - ✧ Build leadership experience

Potential Future Initiatives & Idealistic Ideas

2) Invest in AAPM volunteer services

- Larger experienced and skilled volunteer pool
- Build the capacity/bandwidth
 - ✧ Move away from 100% lecture format at meetings
 - ✧ Incorporate more workshops, debates
 - ✧ Have unconferences
 - ✧ More outreach activities

Conclusion

Take the initiative whether you're a teacher or trainee to make improvements in your educational environment.

Come by our booth and tell us your ideas!

Or take survey at <https://www.surveymonkey.com/r/mp302>