Departments of Oncology and
Medical Biophysics

International Medical Physics Education and Training Needs Over the Next 20 Years

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AAPM 2017 JUL 30–AUG 3
CONNECTING OUR PATHWAYS. UNIFYING OUR PROFESSION.
59TH ANNUAL MEETING & EXHIBITION | DENVER, CO

- Objectives
  - Review recent reports on the need for international medical physicists over next 20 years
  - Review obstacles to providing adequate training
  - Address ways and means of supporting international education
  - How AAPM and other MP organizations can "connect our pathways and unify our profession" internationally

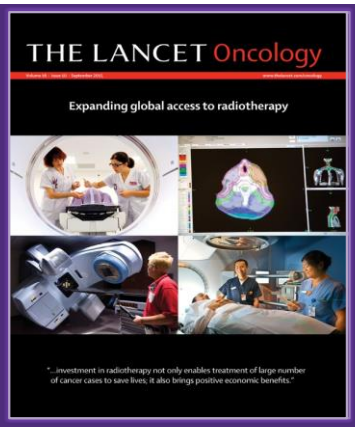
uicc global cancer control
A MEMBERSHIP ORGANISATION FIGHTING CANCER TOGETHER

GTFRCC | UICC PRESIDENT'S PORTFOLIO GLOBAL TASK FORCE ON RADIOTHERAPY FOR CANCER CONTROL
2013

- Union for International Cancer Control (UICC)
  - Global Task Force on Radiotherapy of Cancer Control (GTFRCC)
    - Single question:
- "What does it cost **to close the gap** between what exists today and reasonable access to radiotherapy globally?"

Mary Gospodarowicz
Medical Director
Princess Margaret
President, UICC

David Jaffray
Head of Physics
Princess Margaret
Head of Secretariat

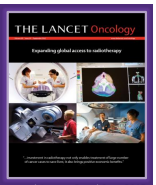


GTFRCC Outcome

- Lancet Oncology Commission report
- 18 authors
- Atun *et al*, Lancet Oncol, 16: 1153-86; Sept 2015.

What is the "Gap"?

- GTFRCC determined
  - Cancer incidence by site by country
    - Number patients needing RT
    - Number of fractions by country
  - Number of departments, machines, personnel by country income level (LIC, LMIC, UMIC, HIC)



Atun *et al*, Lancet Oncol Sept 2015

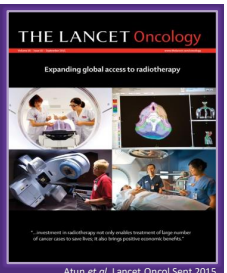
The "Gap"

2013 … Existing
~ 4,200 MV machines in LMICs[1]
2035 … Need … Additional
~ 13,000 linacs in LMICs[1]
~ 22,000 MPs in LMICs[1]
> 1,000 new MPs/yr in LMICs
This is for RT only
- Add another 20-30% for imaging physicists

~ 27,000 MPs in LMICs
> 1,300 new MPs/yr in LMICs

[1]Atun *et al*, Lancet Oncol Sept 2015

Call for Action 3



Atun *et al*, Lancet Oncol Sept 2015

Action 3: human resources for radiotherapy

Target: 7500 radiation oncologists, 20 000 radiation technologists, and 6000 medical physicists to be trained in low-income and middle-income countries by 2025.

RO Medical Physicists … Where?

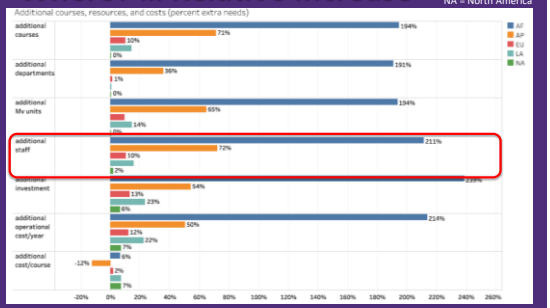
	Upper-middle-income countries	Lower-middle-income countries	Low-income countries
Medical Physicists to be trained	12,500	7,200	2,400

Atun *et al*, Lancet Oncol Sept 2015

Beijing, 2012

Where? … Relative Increase

AF =Africa
AP = Asia Pacific
EU = Europe
LA = Latin America
NA = North America



Analysis of Global Radiotherapy Needs and Costs by Geographic Region and Income Level

E. Zubizarreta *, J. Van Dyk †, Y. Lievens ‡ Clin Oncol 29: 84-92; 2017

Problems … in LMICs

- In Society … some countries
  - Weak/dysfunctional health systems
  - Corruption and lack of transparency
  - Lack of enabling infrastructure
- In Education
  - Lack of education and training programs
  - Inadequate equipment for proper training
  - Lack of experienced trainers
  - Minimal resources for training programs
  - Brain drain

JVD - IAEA ICARO2 Survey Results

2. From your perspective, how would you rate (on a scale of 1 to 10) the following **barriers to the implementation** of new radiotherapy-related techniques or technologies in your context or country?

Lack of money for professional staff	7.41
Lack of proper training for professional staff due to lack of priority by upper level management	7.15
Lack of money for appropriate equipment	6.96
Lack of proper training for professional staff due to unavailability of staff to obtain the needed training	6.67
Lack of proper training for professional staff due to unavailability of funds	6.65
Lack of understanding of the role of radiotherapy in cancer control at the Health Ministry level	6.59
Lack of money for new building or facilities upgrade	6.37
Lack of money for machine servicing	6.35
Absence of national radiotherapy plan	6.3
Lack of appropriately available service for upgraded or new equipment	6.22
Lack of proper training for professional staff due to unavailability of nearby training programs	5.92
Lack of appropriate diagnostic services such as pathology, diagnostic imaging or other relevant clinical service	4.04
Physical infrastructure (lack of uniform and consistent electrical power and chilling water)	3.19
Inadequate national radiation safety regulatory process	2.96

Top 5

JVD - IAEA ICARO2 Survey Results

3. Considering your context or country, please rate the following factors or considerations (on a scale of 1 to 10) that could help **overcome some of the barriers** listed in question 2?

Appropriate prioritization by informed decision makers and/or upper level managers of resources for new techniques or technologies	9.04
Partnering with the IAEA or non-government organizations to provide partial education and training support	8.62
Encouragement by government agencies to support the development of training programs for radiation oncology professionals	8.33
Negotiation support from the IAEA or non-government organization with vendors to provide lower cost technologies	7.93
Full funding by the IAEA or non-government organizations to support out-of-country education and training	7.63
Negotiation support from the IAEA or non-government organization with vendors to provide nearby regional technology service support	7.56
Free provision of local education and training support by the IAEA or non-government organizations	7.41
Partnering with the IAEA or non-government organizations to provide partial financial support	7.22
Partial funding by the IAEA or non-government organizations to support out-of-country education and training	6.41
Donation of money for purchase of technology by the IAEA or non-government organizations.	6.27
Development of national radiation safety regulatory process	5.56

Major barriers
- Lack of money
- Lack of training

Solution to Training

- No simple answer
- No single answer
- Multiple approaches
- Collaboration and partnering

Partnering organizations

- > 35 RT related partnering organizations

Education … How?

- Undergraduate … in native country
- Graduate …. as close to home as possible
  - Outside support/partnering/mentoring
- Residency as close to home as possible
  - Outside support/partnering/mentoring
- Partnering/Mentoring
  - On site visits
    - Lecturing
    - "Hands-on"
  - E-mail/web-conferencing
    - Weekly
    - As needed
  - "Bottom-up" approach

Partnering

- Who?
  - Medical Physicists from better resourced contexts
- How?
  - Retired MPs
  - Sabbaticals
  - Early career
    - Global health interests
  - Donated vacation/work time

"Modest" Proposal

- X% of collective MP FTE for global health support in LMICs
- X = ?
- **If 1%** of >7,000 AAPM full members ≈ 70 FTE
- Could be …
  - 1% donated by institution (20 hr/yr)
  - 1% donated by individuals (20 hr/yr) } 1 wk/yr
    - e.g., sabbatical/vacation/leave of absence
  - Not for everyone … only those with an interest
  - % can vary significantly from one institution to another

"Modest" Proposal Considerations

- Requires philosophical endorsement
  1. Institutions and MPs agree that altruistic support for less developed environments is of value
  2. Needs to be built into the psyche of
     a. Our MP profession (e.g., AAPM/CAMPEP/COMP/CCPM)
     b. Our MP leadership (e.g., department heads)
     c. Our administration (e.g., hospital VPs/administrators)
     d. Our MP education & training programs (grad/residency/CAMPEP)

Summary

- The Medical Physics training needs in LMICs are enormous
- HIC contexts are extremely well resourced & able to provide modest support
- Altruistic support should be considered an imperative of HIC contexts
  - Small % contribution can be built into our infrastructure assuming philosophical agreement that such support is of value
- This modest proposal should be presented to all MP leaders in US/Canada for consideration and implementation

- AAPM and other MP organizations can "connect our pathways and unify our profession" **internationally**
  - By education through …
    - AAPM's International Affairs Committee (IAC)
    - AAPM's International Education Activities Committee (IEAC)
    - AAPM's International Scientific Exchange Program (ISEP)
    - AAPM/IOMP's joint Equipment Donation Program (EDPSC)
    - AAPM's Exchange Scientist Program (ESPSC)
    - AAPM/IOMP library program
    - AAPM's International Training and Research Coordination Subcommittee (ITRCS)
    - Other
      - MPWB (www.mpwb.org)
      - MOU with AAPM

Medical Physics for World Benefit
www.MPWB.org
blending together for effective patient care.

Tuesday 12:15-1:45
Hyatt, Mineral Hall A
3rd floor