

Global Task Force on Radiotherapy for Cancer Control

Summary of the Orientation and Planning Meeting
October 1, 2013 RAI Amsterdam

10/16/2013



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Meeting Agenda

Global Task Force on Radiotherapy for Cancer Control Orientation and Planning Meeting

0800-1200 October 1, 2013

RAI Amsterdam Room D-403

Agenda

0800-0815	Welcome and Overview	M. Gospodarowicz D. Jaffray
0815-0835	The Global Cancer Burden	D. Rodin
0835-0855	The Role of Radiotherapy in Cancer Control	W. MacKillop
0855-0930	Elements of Radiotherapy: Infrastructure Practice	D. Jaffray/J. van Dyk M. Milosevic
0930-0950	Framework of Analysis	R. Atun/D. Jaffray
1000-1100	Discussion	All

I Welcome and Introductions

The meeting was called to order by Dr. David Jaffray, who reviewed the agenda and requested feedback from attendees to help construct an inventory of individuals or organizations performing similar work.

Dr. Mary Gospodarowicz thanked ESTRO and ECCO for support for the Global Task Force for Radiotherapy for Cancer Control (GTFRCC) initiative and for providing space for this meeting. She reminded attendees of the purpose of the UICC: “...to unite the cancer community to reduce the global cancer burden, to promote greater equity, and to integrate cancer control into the world health and development agenda.” The Global Task Force for Cancer Care and Control (GTF.CCC) report Closing the Cancer Divide identified large gaps between high and low and middle income countries (LMICs), in access to cancer services including access to radiotherapy. In collaboration with GTF.CCC, UICC leadership established the GTFRCC under the UICC President’s Portfolio. This initiative was undertaken because it is evident that failure to invest in radiotherapy will result in unnecessary loss of life and reduction in quality of life. An important first step is to project the future role of radiotherapy (RT) globally and the investment required to ensure global access. In that regard, the Task Force has been charged by the Board of UICC to answer a single question: “What does it cost to close the gap between what exists today and reasonable access to radiotherapy globally?” Report due at the World Cancer Congress 2014.

David Jaffray then reviewed the structure and aims of the GTFRCC. He suggested that if we can determine what is needed to achieve global equity in access to RT by 2025, then we should be able to calculate the cost to get there. The definition of reasonable standard of RT is debatable but falls within the realm of sensitivity analysis. Key assumptions in such an analysis include:

- 1) Radiotherapy will be part of cancer control in 2025;
- 2) The cost of radiotherapy equipment and resources will not change substantially in the next 12 years;
- 3) There is sufficient health system and societal infrastructure in place to enable radiotherapy.

The goal of this initiative should be to increase awareness of the growing crisis in RT access globally, and to provide targets for government investment in RT capacity. It should stimulate the search for solutions to human resource challenges in delivering RT as well as ensure that RT is part of the cancer control discussion and that the growing hospital infrastructure is equipped for RT deployment. Further, this initiative should stimulate industry investment in RT technology, possibly at a lower price point, and precipitate capital investment in RT infrastructure. This will be accomplished by adopting a framework, successful in other global health initiatives, of engaging members and encouraging them to contribute to the effort and to endorse the findings.

The GTFRCC is composed of an Honorary chair (President Tabare Vasquez), a Secretariat to guide the work of the task force, individual task force members (from radiation oncology, oncology, global health, industry), various supporting organizations with UICC as the sponsoring organization.

OBJECTIVES FOR THE MEETING

1. Inform the community about the activity
2. Clarify the charge and activity with respect to other important initiatives –
 - a. Has this been done before?
 - b. Is there a need for this work?
3. Get feedback/guidance
4. Test for overlap/complimentarity with other disciplines
5. Identify key organizations or individuals that should be involved.

II Cancer in Context-- Understanding the Global Burden of Disease

KEY MESSAGES:

- ✚ Cancer is a significant global cause of overall mortality and of disability-adjusted life years (DALYs).
- ✚ As life expectancy has increased, the burden of disease due to cancer and other non-communicable diseases has grown in parallel.
- ✚ There continue to be large worldwide inequalities in the incidence of cancer and in cancer-related mortality.

The first speaker on the agenda was Dr. Danielle Rodin from the University of Toronto. Dr. Rodin reviewed two major epidemiological studies on the burden of cancer: 1. Global Burden of Diseases, Injuries and Risk Factors Study 2010 (GBD2010) and 2. the GLOBOCAN 2008 project, specifically publications related to the global burden of cancer and pediatric cancers.

GBD 2010 is the first systematic and comprehensive assessment of data on disease, injuries and risk since 1990. It reflects the collaboration of 488 scientists from 303 institutions in 50 countries, led by the Institute for Health Metrics and Evaluation. Between 1990 and 2010, male healthy life expectancy (HALE) increased by 5 years or more in 48 countries compared with an increase in 43 countries for females. However, men also experienced a decrease in HALE in 22 countries, compared to a reduction in 11 countries for females. A consistent trend observed was that the rise in years of life lost to disability rose in parallel with life expectancy. Changing mortality patterns from 1990 to 2010 through the metric of years of life lost (or YLL), a measure of premature mortality, were also reviewed. Overall in 2010, there were 52.8 M recorded deaths, of which 35.5 million or 65% were due to non-communicable diseases (NCDs). A 38% increase in cancer related deaths since 1990 was observed.

Next, Dr Rodin reviewed the GLOBOCAN project, which uses cancer registry data from IARC. The aim of this project was to provide estimates of the incidence, mortality, prevalence, and DALYs from 27 major types of cancers for 184 countries in 12 world regions. The most recent available data is from 2008, but the 2012 data is expected to be published early next year. Based on the 2008 data, a total of 7.6 million cancer deaths were observed and 170 million healthy life years were lost due to cancer. Breast cancer was the major contributor to total DALYs in all regions except eastern Asia, and to lung cancer in all regions, except sub-Saharan Africa, where 36% of the total DALYs were attributable to Kaposi's sarcoma, liver and cervical cancer, as well as to non-Hodgkin's lymphoma. Breast cancer is the leading cause of DALYs in 119 of the 184 countries, compared with cervical cancer being the leading cause of DALYs in 49 countries. In terms of YLL, cervical cancer contributed more to premature death than did breast cancer in 23 countries, mostly in sub-Saharan Africa and central and South America. Childhood cancer constitutes only a small proportion of the global cancer burden, but 84% of childhood cancers occur in low and middle income countries, reflecting their greater proportion of young people in their population. Incidence rates are far greater than mortality rates in countries with a high human development index, but these rates more closely approximate one another in low HDI countries, where fewer resources are available.

III The Role of Radiotherapy in Cancer Control

KEY MESSAGES:

- ✚ Treatment is an important element of cancer control (prevention and treatment are complementary).
- ✚ Radiotherapy (RT) is an indispensable element of a comprehensive cancer control program.
- ✚ The societal benefits of RT depend on its accessibility (and its quality).
- ✚ Access to RT is less than optimal in many parts of the world, both rich and poor.
- ✚ Making good quality RT more accessible in lower income countries has the potential to reduce the burden of cancer dramatically.
- ✚ Increasing the use of RT in lower income countries presents unique challenges, but none should be regarded as insurmountable.

The next speaker was Dr. William Mackillop from Queens University. Dr. Mackillop began with reference to the WHO Declaration on Cancer Prevention and Control 2005: “All nations should develop comprehensive cancer control programs, through the systematic implementation of evidence-based strategies for prevention, early detection, diagnosis, *treatment*, rehabilitation and palliative care.”, and further that All nations should improve access to appropriate technologies and frame policies for strengthening and maintaining equipment for diagnosis and treatment.

The impact of prevention was put in context by referring to work of Dr. John McLaughlin of Cancer Care Ontario, who showed that the impact of meeting the CCO primary prevention targets would be a 3.2% reduction in incidence for females, and 2.6% for males. However, the mortality/incidence ratio is 0.45 for all cancers in Canada and 0.75 in LMICs. RT can play a role in reducing this mortality/incidence ratio. There is high level evidence of the efficacy of radiotherapy in many common clinical situations and is relatively inexpensive. Cost per fraction varies widely and is generally lower in LMICs. RT has also been shown to be cost effective: the cost per year of life gained for lung cancer is \$9881 and year of symptom control \$13938. (Barbera et al Estimating the benefit and cost of radiotherapy for lung cancer. Int J Technol Assess Health Care 2004).

Dr. Mackillop then reviewed estimates of the proportion of patients who benefit from RT. Evidence-based approaches to this calculation including identifying all indications for RT based on systematic review, estimating the incidence of each indication in the cancer population, and integrating this information to estimate overall requirement for RT (e.g. Tyldesley et al IJROBP 2000, Delaney et al, Cancer 2005). Dr. Mackillop indicated that approximately 50% of all cancers will benefit from RT at some point during the course of the disease.

Dr. Mackillop noted that there is substantial variability in use of radiotherapy across jurisdictions. Within Europe, the underutilization rate is estimated to be 19% (range 0 to 75% Rosenblatt et al, IAEA, Lancet Oncology 2013). In Africa, an estimated additional 700 machines are required to meet a 50% target of RT use in incident cases (Abdel-Wahab et al, IAEA, Lancet Oncology, 2013), although deploying

treatment machines does not in itself ensure competent and appropriate treatment delivery. Finally variations in RT usage in Ontario demonstrated that variability in utilization can occur even in well-funded cancer systems.

Comments:

- ❖ The benchmarking data reinforce that there is an asymptote in terms of optimal distribution
- ❖ Observations from developed countries show the importance of addressing the shortfall and this information must inform any costing model.
- ❖ The point about the impact of prevention strategies is well taken. The expectations that cervical cancer would be solved by advent of HPV vaccinations was not realized.
- ❖ Need to tailor strategies to local environments --societal and governmental elements can undermine successful deployment.
- ❖ 80% of DALYs occur in regions where there is 5% of global expenditure on cancer.
- ❖ Utilization variations are seen in the Netherlands as well, where geographic variations are smaller.
- ❖ The variations in utilization observed in mature cancer systems are low-hanging fruit. This should be framed not as just an LMIC issue, but that all jurisdictions should be helped to get to the right place.

IV Elements of Radiation Therapy –Infrastructure and Programmatic Requirements

KEY MESSAGES:

- ✚ The core elements of a radiation facility are well understood.
- ✚ Investments in human resources and education are required for safety and stability.
- ✚ A systems-thinking approach is required to address the challenges of global RT deployment.
- ✚ Radiotherapy systems are complex and require a high level of programmatic sophistication for safe operation.
- ✚ There is a need and opportunity for international collaboration and harmonization of national guidance and standards documents.

Dr. David Jaffray and Dr. Jake van Dyk reviewed the key elements required for RT. They began by acknowledging that RT is multidisciplinary, computationally intensive, technical, and possibly one of the most complex procedures in healthcare.

The basic foundations for RT deployment include: government stability, a basic healthcare system that allows for detection, diagnosis and follow-up, a radiation safety regulatory process, public utilities and environmental services, and service provision including a robust parts inventory and deep expertise.

Standard RT equipment would go beyond megavoltage teletherapy delivery systems and include planning imaging, treatment planning, IT infrastructure and brachytherapy systems. Costs go beyond the capital cost of equipment and include overall facility costs, maintenance and operating expenses, training, and eventual disposal costs (especially important for isotope-based systems). Work has been done by the IAEA to evaluate these costs in various jurisdictions. An RT facility must include space for simulation/imaging, treatment planning, treatment, clinic space, offices and QA laboratory, server rooms.

The human resource staff complement should include the standard professional groups (radiation oncologists, physicists, therapists, oncology nurses, dieticians...) as well as specialized support staff (technicians, IT support clerical). The numbers and mix of each should be driven by caseload and facility type (e.g., private versus academic).

Several guidance documents exist that speak to the running of an RT facility. There is a need for a systems thinking approach to transcend the complexity. Applications include modeling of RT facility placement (contrast Africa, Canada), re-examining our education philosophy, or modeling the savings associated with technological advances (automation, remote support, more reliable technologies).

The challenges in modeling these costs to achieve equity in 2025 were outlined. What will be the technological standard? How broad is the scope? Do we consider costs outside of the RT sphere?

What key assumptions will be made around equipment utilization and practice variations? Will we model education costs based on classical or new approaches? Will the analysis stratify by country, region, or by a tiered economic approach as has been suggested elsewhere?

The floor was then given to Dr. Michael Milosevic to discuss how a radiation program can build the elements together safely to deliver care. Generally, this requires a high level of sophistication and programmatic support. There is a need to acknowledge the natural tension between the competing drivers efficiency, quality/safety, and complexity and change – all within a constrained environment. Elements of an optimal radiation program include: accessibility, adequate personnel/equipment, optimal performance of program/equipment, emphasis on quality and safety, and continuous education all within a patient-centered framework.

The impact of poor quality radiation therapy on clinical outcomes is well documented, and the system must support quality assurance both at the programmatic and patient-specific levels. There is a general requirement for standardization and overall harmonization of national standardization activities. Incident learning systems must be in place to drive safety improvements and help learn from mistakes.

Comments:

- ❖ Industry is under-represented at this meeting (MG – UICC is engaging many industries in GTFRCC, and we are open to broader participation).
- ❖ It is possible that disruptive technologies will arise, but we won't wait for them. We need to estimate based on what we know. We have a perception that RT is expensive, but it may be more about complexity and education.
- ❖ Equipment has been increasing in cost due to technological advances. Costs related to carrying complexity may reduce.
- ❖ Need to address challenges in helping governments to understand the field and HR requirements. Need to demystify not only RT but also cancer itself, so that populations/govts/individuals are open to treatment.
- ❖ We need to be cognizant of risk. RT carries additional responsibility compared to other treatment modalities.
- ❖ The worst outcome of RT is complicated failure.
- ❖ We need to budget for robust deployment.

V Towards an Investment Framework for Radiation Therapy for Cancer

KEY MESSAGES:

- ✚ An investment framework for RT can present the cost in terms of the societal and economic benefits that could arise. Such a framework can present an organizing principle for a clear set of actions with a well-defined time horizon.
- ✚ HIV, Tuberculosis, and Malaria provide examples for the radiotherapy community of successful frameworks.
- ✚ Elements for an investment framework for radiation therapy might include: the burden of disease, cost-effective interventions, health system readiness and feasibility, and cost and benefit of investment.

Dr. Rifat Atun from Boston presented on possible investment frameworks for RT. An investment framework presents more than just the cost of activity; it also includes the benefits in health and economic terms, and a clear time horizon. It is an organizing principle for a clear set of actions.

Examples of investment frameworks for other disease sites were discussed. The first dealt with the Global Fund initiative on HIV/AIDS. For a cohort of 3.5 million patients funded to receive anti-retroviral treatments, it was shown that 2.5 million would still be living within a decade (versus almost none surviving without ART). This reflected a total of 2.5 million annual life-years gained. The economic benefit of this investment in terms of productivity gains from healthy individuals, care costs averted, and savings from delaying end of life care more than offset the cost of the intervention. (Resch *et al.*, PLoS One 2011; Schwarlander *et al* ,The Lancet 2011; 377:2031-2041).

The UNAIDS HIV Investment Framework has two major components: Core investments and critical enablers. Intervention alone is not enough – there is a need to generate demand, increase visibility and provide advocacy at higher levels, to ensure that the health system is ready to scale up the activity. There is a need to be clear on where funds can be channeled and what can be achieved with these investments. The UN HIV Investment framework targeted reductions in new infections and related deaths.

Investment framework for tuberculosis (Stop TB) demonstrated synergies with other health sectors. The Global Malaria Action Plan (GMAP) calculated the total cost of controlling malaria (prevention, diagnosis, global malaria programs) and demonstrated reductions in mortality under varying investment timelines.

Elements of the investment framework for RT were then proposed:

1. Burden. Data for this section would include epidemiology for radiation responsive cancers, trends over time and 20 year projections sourced from IARC, GBD 2010.

2. Cost effective interventions. Data would include core interventions, critical enablers, cost of core interventions and enablers, effects of core interventions and enablers. These data would be sourced from systematic reviews and, in their absence, Delphi studies.

3. Health System Readiness and Feasibility includes mapping of existing capabilities (infrastructure, HR). Sources might include data from the IAEA, multi-country surveys, key informant interviews. We need a long term HR training and retention strategy to achieve this.

4. Cost and Benefit of Investment. Calculate the costs at varying scales, and benefits in terms of mortality reductions, lives saved, DALYs averted, economic benefits. The estimates might be based on modeling estimates and Delphi studies.

Comments and Questions:

Q: What were the biggest barriers to adoption of this framework?

A: In relation to HIV the previous investments were not well targeted, and there was not a single body to say how we should invest. How to balance donor-driven investment versus country demand must be addressed. Having legitimacy is important – need to engage all players including countries.

Q: HIV was successful but had tremendous political and star capital. Do you have suggestions on how cancer world can do something similar?

A: TB and malaria initiatives learned from HIV to use international agencies and media. It is particularly important to be clear on message.

Q: HIV/TB/Malaria interventions seem simple compared to RT services. How confident are you that we will be able to adapt this framework to a seemingly more complex intervention?

A: Pay attention to defining the language to the communities that are benefiting. How do we communicate RT? Need a language that laymen and donors can relate to.

Q: Need to know what kind of model will be considered for RT rollout to do this exercise. What are core interventions? Those that produce a high survival benefit or all interventions? Enablers for RT include DI, pathology, etc .

A: Need working groups to identify what enablers are required. Was a source of debate during HIV project. Legitimacy arises from consensus and not everything can be included.

VI Closing remarks

Dr. David Jaffray thanked the audience for their enthusiastic participation, and the speakers for framing the problem. The challenge will be to adapt existing investment methodologies to the problem of radiotherapy deployment. We will continue to seek input and grow the task force in the coming months.

Dr. Cornelis Van de Velde, President of ECCO described EUREKA, an oncology QA system working in Europe that measures the impact of interventions on outcomes. This resonates with earlier comments that we need to build a quality framework or that we risk doing more harm than good, and that a multidisciplinary effort is important to ensure that appropriate investments are identified.

Dr. Mary Gospodarowicz closed the meeting, reminding attendees to forward the names and email addresses of individuals activities, or organizations to whom we should reach out. She noted that we specifically need experts in radiotherapy, cancer, and global health, as well as young leaders who will ensure the work of the task force endures. Dr. Gospodarowicz thanked all of the speakers and the attendees for their participation and contribution to the meeting.

Appendix 2. Speaker Biographies



Mary Gospodarowicz is the current President of UICC. She is Medical Director of the Princess Margaret Cancer Centre at the University Health Network in Toronto, Canada and Regional Vice-President of Cancer Care Ontario for Toronto South. She recently completed a 10 year term as Professor and Chair of the Department of Radiation Oncology at the University of Toronto and Chief of the Radiation Medicine Program at Princess Margaret.



David Jaffray (Head of Secretariat) is Head of Radiation Physics at Princess Margaret Cancer Centre and Senior Scientist within the Ontario Cancer Institute. He is Professor in the Departments of Radiation Oncology and Medical Biophysics, and Vice Chair of the Department of Radiation Oncology at the University of Toronto.



Danielle Rodin is a Resident in the Radiation Oncology program at the University of Toronto. She received an Hon. B.A. from McGill University, her M.D. from the University of Toronto, and is currently pursuing a MPH at Harvard University. Danielle has had a long-standing interest in public health and has previously worked at the McGill Institute for Health and Social Policy and at the World Health Organization. She has also pursued fieldwork in Cambodia and Malawi and is Junior Editor for The Oncologist section on Global Health and Cancer.



William Mackillop is a Radiation Oncologist. He is Professor and past Chair of Public Health Sciences at Queen's University in Kingston, Ontario. Mackillop has published extensively regarding timely access to cancer treatment, and appropriate access to radiotherapy. He was founding director of the Division of Cancer Care and Epidemiology at Queen's Cancer Research Institute.



Michael Milosevic is a Professor in the Department of Radiation Oncology at the University of Toronto and a Radiation Oncologist at Princess Margaret Hospital. He is a Past-President of the Canadian Association of Radiation Oncology (CARO), and Chair of the Canadian Partnership for Quality Radiotherapy (CPQR)



Jake Van Dyk is Professor Emeritus of Oncology, Medical Biophysics, Medical Imaging, and Physics and Astronomy at the Western University, London, Ontario, Canada, and former Manager (Chief) of Physics and Engineering at the London Regional Cancer Program of the London Health Sciences Centre. He also participates as a consultant and lecturer for the IAEA and WHO.



Rifat Atun is Professor of International Health Management at Imperial College London and Head of the Health Management Group. Dr. Atun has worked extensively with the World Bank, World Health Organization, and the UK Department for International Development on design, implementation and evaluation of health system reform programmes in more than 20 countries, and has advised a number of governments in Europe, Latin America, Central Asia and the Middle East.

Appendix 2. List of Attendees

1. Laura Dawson Princess Margaret Cancer Centre, Toronto
2. Jason Efstathiou Massachusetts General Hospital, Boston
3. Michael Milosevic Princess Margaret Cancer Centre, Toronto
4. Jake Van Dyk Western University
5. Danielle Rodin University of Toronto
6. Julie Torode UICC
7. Kolleen Kennedy Varian Medical Systems
8. Ben Mijnheer Netherlands Cancer Institute
9. Brian O'Sullivan Princess Margaret Cancer Centre, Toronto
10. Bill Mackillop Queens University
11. Max Dahele VU University Medical Center, Amsterdam
12. Ophira Ginsburg University of Toronto
13. Christine Verfaillie ESTRO
14. Jens Overgaard Aarhus University Hospital, Denmark
15. Caroline Chung Princess Margaret Cancer Centre, Toronto
16. Peiman Haddad Tehran Cancer Institute, Iran
17. Harry Bartelink Netherlands Cancer Institute
18. Tim Hanna Queens University
19. Mei Ling Yap Liverpool Hospital, Sydney(guest)
20. Philip Poortmans Institute Verbeeten, Netherlands
21. Vincenzo Valentini President ESTRO
22. Cornelis van de Velde President ECCO
23. Mary Gospodarowicz President UICC
24. David Jaffray Princess Margaret Cancer Centre, Toronto
25. Miller MacPherson Princess Margaret Cancer Centre, Toronto
26. Ted Deweese (online) Johns Hopkins University
27. Geoff Delaney(online) University of New South Wales
28. Rifat Atun (online) Imperial College London
29. Joseph M Kigula(online)AFROG
30. Graeme Morgan(online)
31. Ahmed Elzawawy(online)ICEDOC
32. Anne Lee Shenzhen University, Hong Kong
33. Michael Baumann University of Dresden