Break out session: Radiotherapy

Global Task Force on Radiotherapy for Cancer Control
International Atomic Energy Agency

Working group 2: Co-chairs: Jake Van Dyk, Eduardo Rosenblatt

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Session code: Global Cancer Summit
Overall Aim

to determine the core investments
- facilities
- equipment
- personnel

needed to develop radiation therapy capabilities
to provide uniform global access by 2035

to compute the related costs
Primary Objectives

Definition of the Radiation Therapy Package
Quantification of the Needs in Terms of the Package

Operating Cost Per Fraction
(Rate #1 – USD$/Fraction Delivered)

Up-front Cost to Establish Capacity, Per Fraction
(Rate #2 – USD$/Fraction Established)
Patient Assessment

Imaging for RT Planning

Treatment Planning

Pre-Treatment Review and Verification

Treatment Delivery

On-Treatment Quality Management

Post -Treatment Completion

x N Fractions

AAPM process map, Ford et al.
* Patient Assessment

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On-Treatment Quality Management

x N Fractions

Post-Treatment Completion

3D-CRT
IMRT
IGRT

* Equipment and Software Quality Management

AAPM process map, Ford et al.
Radiotherapy treatment cost is highly dependent on:

- Treatment complexity
- Fractionation
- Salaries vs. equipment
- Operational model
- Size of the department

**HIC**
- Personnel: 50%
- Capital: 30%

**LMIC**
- Personnel: <30%
- Capital: >50%

Ploquin and Dunscombe, R&O 2008
Personnel

Operating Cost Per Fraction
- yearly salaries
- maintenance cost of equipment
- amortization cost of facilities and equipment
- + overhead

Up-front Cost to Establish Capacity, Per Fraction
- personnel training cost
- investment cost of facilities and equipment

How many facilities and equipment?
How much personnel?
Fractions & Courses for Full Access to RT in 2035

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<th>U-MIC</th>
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The GTFRCC Radiation Therapy Package

- 4 linear accelerators
  + multi-leaf collimator
  + electronic portal imaging
- 3DCRT capability
- 50/50 single/multi-energy
- + brachytherapy equipment

1 CT-simulator

3D Treatment Planning
  up to 10 work stations
  Record and Verify System

“Foundational package”: 3D-CRT

Buildings: required dedicated radiotherapy and general building surface, in m²
Time-Driven Activity-Based Costing Model

- number of fractions and courses
  - + facility size and level of complexity
  - + operational model
    - working days, operating hours
    - definition of time required per activity in radiotherapy process
    - percent of non-radiotherapy related activities

→ required number of facilities, equipment and personnel
### Need for Full Access to RT in 2035

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<td>Number of CT Scanners</td>
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<td>Number of MV Machines</td>
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<td>Number of RTT Trainees</td>
<td>18,515</td>
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Time-Driven Activity-Based Costing Model

required number of facilities, equipment and personnel
+ costs
  salaries, cost of equipment and construction
  maintenance cost of equipment, amortization cost of facilities and equipment, overhead costs
  training costs
→ Operating Cost Per Fraction
→ Up-front Cost to Establish Capacity, Per Fraction
Operating Cost Per Fraction

$50 USD / fraction

Cost per Patient @ ~18 Fractions/Course of Radiotherapy:

$905 USD / patient

Up-front Cost to Establish Capacity, Per Fraction

$280-290 USD / fraction
Radiotherapy is well defined and highly standardized

The major cost components are personnel and equipment

The current capacity is limited in LMIC

It is feasible to compute
  the investments needed
  and the yearly operational costs incurred
  to bring radiotherapy to full access by 2035
thanks to

Jake Van Dyk and Eduardo Rosenblatt
Eduard Zubizarreta
David Jaffray

the other GTFRCC Working Group 2 members
Mary Coffee, Andres Cordova, Penelope Engel-Hills, Tomas Kron,
Michelle Leech, Ahmed Meghzifene, Ben Mijnheer, Michael Milosevic,
Joseph Mugabe, Bhadrasain Vikram

Tracey Lui and Miller McPherson

Mary Gospodarowicz