Innovative, Robust and Affordable medical linac technologies for challenging environments

Manjit Dosanjh, CERN
Predicted Global Cancer Cases

Source: WHO GloboCan
Cancer is a growing challenge

Globally 15 million (2015) to 25 million in (2035)

Effective cancer care uses radiation therapy for about 50% of the patients

1 million inhabitants recommendation is 5 or more linacs

Challenge: how to go from no or limited radiotherapy to high quality radiotherapy globally
RT is an essential part of the cancer treatment
Globally: no of machines per 1 million inhabitants

Slides from IAEA, Dirac
World wide radiotherapy coverage
RADIOThERAPY IN AFRICA

21 countries with RT in 1995

23 countries with RT in 2017

60 YEARS OF MEGAVOLTAGE RADIOThERAPY IN AFRICA

Historical mean = 0.1 MV unit per million population
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0.25 MV units per million population (1 MV unit serves 4 million), in contrast with HIC with 5 MV units per million (2000% difference)

26 October 2017

Slides from IAEA, Dirac
Needs by 2035 in LMIC

Globally 15 million (2015) to 25 million in (2035):

- 12,600 megavolt-class treatment machines
- 30,000 radiation oncologists
- 22,000 medical physicists
- 80,000 radiation technologists

Standard staffing ratios

26 October 2017
CERN hosted workshop on:
“Design Characteristics of a Novel Linear Accelerator for Challenging Environments”

Norman Coleman, David Pistenmaa (ICEC) Manjit Dosanjh (CERN)

International Cancer Expert Corps & CERN

European Organization for Nuclear Research (CERN)
International Atomic Energy Agency (IAEA)
James Martin Center for Nonproliferation Studies (CNS)
National Aeronautics and Space Administration (NASA)
National Nuclear Security Administration (NNSA)
Introduction

Convened By: Hosted By:

The Workshop addressed:

1) the role of radiotherapy in treating cancer in challenging environments such as in many low- and middle-income countries (LMICs) and the related security concerns of medical radiological materials,

2) the design requirements of linear accelerators and related technologies for use in challenging environments,

3) the education, training and mentoring of the sustainable workforce needed to utilize novel radiation treatment systems

4) the costs of and financing for the implementation of the recommendations from the workshop.

Slides provided by David Jaffray
Task Forces

• **TF1: Technology (Bury the Complexity)**
  a) near term  b) long term

• **TF2: Education, Training and Mentoring**

• **TF3: Global Connectivity and Development**

https://indico.cern.ch/event/560969/
Recommendations & Actions

**Technology (“Bury the Complexity”)**

Develop optimal design requirements for a novel high-quality, lower-cost treatment solution that leverages existing linac technologies and incorporates intelligent software designed for robust operation in a range of challenging environments.

**Education, Training, and Mentoring**

Identify 1) the education and training requirements for current as well as future radiotherapy equipment and treatment systems worldwide, 2) the current extent of education and training program resources and 3) the education and training needed to fill the gaps.

**Global Connectivity and Development**

Develop and implement a strategy for securing financial support in client countries as well as from governmental, academic and philanthropic organizations and individuals to insure success of the effort to make excellent near-term and long-term RT systems.

Slides provided by David Jaffray
This workshop is focussing on Task Force 1