

Cancer kills far too many people – particularly in Africa.

Rays of Hope sets out to change that by supporting the establishment of radiotherapy services, starting with the 23 countries that completely lack the facilities for radiation treatment.

Rays of Hope

Closing gaps in cancer care



One country in four does not have access to a single radiotherapy machine. This is a sobering statistic. And it is unacceptable.

– Rafael Mariano Grossi, IAEA Director General



IAEA



With over 19 million new cases and 10 million deaths in 2020 alone, the global cancer burden is expected to grow to 30 million new cases and 16.3 million cancer deaths by 2040. The disease places its heaviest burden on low- and middle-income countries (LMICs) where over 70% of cancer deaths are expected to occur, yet these countries receive only 5% of global spending in this area.

Over half of cancer patients require radiotherapy at some point, but this ratio is significantly higher in countries where cancer is often recognized in late stages only. Over 70% of the population of Africa does not have access to radiotherapy. The situation is most acute in the countries that lack facilities and trained personnel in radiotherapy altogether.

Even though the assistance provided by the IAEA has enabled many countries to establish safe, secure and effective radiotherapy capabilities over the last decades, the IAEA needs more resources to bridge the enormous shortfall in equipment and highly skilled and well-trained personnel in the poorest countries.

IAEA'S ROLE IN FIGHTING CANCER

The IAEA has six decades of experience in helping countries fight cancer. From procuring equipment for diagnosis and treatment to training staff on its safe, secure and effective use and providing quality assurance services, the IAEA helps countries respond to the growing cancer burden.

Tackling the burden of cancer requires systematic, equitable and evidence-based strategies for prevention, early detection, diagnosis, treatment and palliation. These strategies have to be formulated into a national cancer control strategy. This requires inclusion of all elements across the cancer continuum, framed by health

systems and supported by effective financing strategies, monitoring systems and quality management.

Rays of Hope will integrate the breadth of the IAEA's expertise to support Member States in the diagnosis and treatment of cancer.

IMPROVING CANCER OUTCOMES THROUGH RADIATION MEDICINE

Complementing the ongoing efforts of the IAEA to assist Member States improve their cancer care capacities, the Rays of Hope initiative focuses on countries most in need: those that lack radiotherapy services altogether or have a poor coverage of the required infrastructure. Rays of Hope will directly contribute to the fulfilment of the 2030 Agenda and the Sustainable Development Goal (SDG) 3 (Good Health and Well-Being), target 3.4 (Reduce premature mortality from non-communicable diseases).

The projects included in the initiative, based on innovative research and a focus on sustainability, will build or strengthen radiation safety legislation and infrastructure and provide quality control, guidance, training and equipment. Rays of Hope combines several elements into a set of interventions that build on and complement each other in order to maximize impact. Through a sharp focus on countries without radiotherapy or with poor access, Rays of Hope will initially focus on prioritizing a limited number of high-impact, cost-effective and sustainable interventions in line with i) national capacities, ii) national needs, iii) measurable processes and iv) outcome objectives.

In order to successfully launch the initiative, ensure its sustainability and maximize impact, the IAEA is mobilizing additional resources, advocacy and partnership opportunities.

GLOSSARY

Radiotherapy: is a therapy using ionizing radiation for cancer treatment to control or kill malignant cells

External beam radiotherapy: a therapy that uses a machine to aim radiation at the cancer from outside of the body

Internal beam radiotherapy / Brachytherapy: a cancer treatment administered using a dedicated machine containing radioactive sources and delivered using applicators inserted in or near the tumor

Bunker: a dedicated special room that houses radiation therapy equipment and complies with radiation safety specifications and requirements

FUNDING NEEDS

Radiotherapy is an essential component of cancer care and has a demonstrated benefit on extending life span and increasing survival rates. It uses ionizing radiation emitted by a radiation source to attack and kill cancer cells. A safety infrastructure is paramount to protect patients and staff from the harmful effects of ionizing radiation. Various machines are required for the treatment of cancer, including simulation units, cobalt machines and linear accelerators, which provide radiation externally, as well as equipment to administer radioactive isotopes directly to cancerous tissue in the body.

The packages below comprise optimal combinations of such machines and are built upon decades of experience of the IAEA in assisting countries in the development of safe and secure radiotherapy facilities. The funding needs listed here are for building the facility, purchasing the equipment and training the personnel. Also included are the operating costs for two years to better support sustainability.

The IAEA will also support the development and strengthening of radiation safety infrastructure. The packages include Innovation and support for Regional Anchor Centres. Innovation is essential to ensure available resources are used to scale up quality access to radiation medicine. It includes the participation of recipient country experts in online training events and professional discussions, as well as in innovation such as research to increase the cost efficiency and effectiveness of interventions. Regional anchor centres will provide much of the training and quality assurance to countries nearby. However, these anchor centres need to first improve their educational and quality assurance infrastructure and be provided with tools to support continuous improvement in the region.

The packages will also contribute to advancing donor development priorities including, gender equality, reducing health inequities for women and children, enhancing education and training, fostering socio-economic inclusion.

Package 1

Value: US\$ 7.5 million

Capital costs and operating costs over two years, including participation in ongoing learning activities and support from a regional anchor centre of excellence

- Optimal as entry package for countries of limited financial and human resources that lack radiotherapy.
- It can treat optimally up to 500 cancer patients per year and is scalable with a second treatment unit for a total of 1000 cancer patients per year.

Includes:

1. Two bunkers
2. One conventional simulator
3. One teletherapy cobalt unit
4. One HDR brachytherapy afterloader

Features:

- Less dependence on water and electricity infrastructure
- Maintenance needs are lower, leading to less expected downtime
- Shorter learning curve required to operate

Package 2

Value: US\$ 12.5 million

Capital costs and operating costs over two years, including participation in ongoing learning activities and support from a regional anchor centre of excellence

- Optimal as entry or expansion package for countries with trained human resources and enough financial capacity to sustain maintenance costs.
- It can treat optimally up to 1000 cancer patients per year. Equipment configuration can be upgraded to tailor future needs.
- Requires reliable electricity and water supply.

Includes:

1. Two bunkers
2. One CT-simulator
3. Two single-energy LINACs
4. One HDR brachytherapy afterloader

Features:

- No need for exchange of radioactive cobalt source, therefore logistics of long-term operations is easier and there is no nuclear security concern
- Requires reliable infrastructure
- Longer learning curve / prior knowledge and training desirable to operate

Package 3

Value: US\$ 16 million

Capital costs and operating costs over two years, including participation in ongoing learning activities and support from a regional anchor centre of excellence

- Optimal as expansion package for countries with previous experience in radiotherapy service delivery and enough financial resources to sustain it.
- It can treat up to 1000 cancer patients per year with the more advanced techniques, but higher maintenance costs. Needs reliable electricity and water supply, as well as resource-intensive quality assurance programme.

Includes:

1. Two bunkers
2. One CT-simulator
3. Two multi-energy LINACs
4. One HDR brachytherapy afterloader

Features:

- Greater versatility in tailoring procedures to individual patients' needs
- Requires reliable infrastructure
- Longer learning curve / prior knowledge and training required to operate
- Higher ongoing maintenance costs the recipient country will eventually need to bear

Conventional simulator: an X-ray machine used to plan radiotherapy treatment

CT-simulator: a special computed-tomography unit used to plan radiotherapy treatments

Teletherapy unit: a medical device used to deliver external beam radiotherapy from outside the patient at a specified distance

(teletherapy) to treat cancer; two main types: Cobalt-60 units and Linear Accelerators (LINAC)

Brachytherapy afterloader: a medical device incorporating a miniaturized source, with a computer-controlled mechanism used to drive the source to deliver radiation from a short distance inside the patient.

PARTNER CONSULTATIONS

In preparation for the launch of the Rays of Hope initiative, the IAEA is pursuing a series of partner consultations.

We seek cooperation from donor Member States, the private sector, development agencies and international financial institutions for this ambitious activity. By organizing a coalition of donors and partners, in collaboration with Member States who want to implement these activities, we can best support the enhancement of radiation medicine and save lives.

More information on the Packages listed in this document, including detailed calculations, are available on request. Email: RaysOfHope@iaea.org



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