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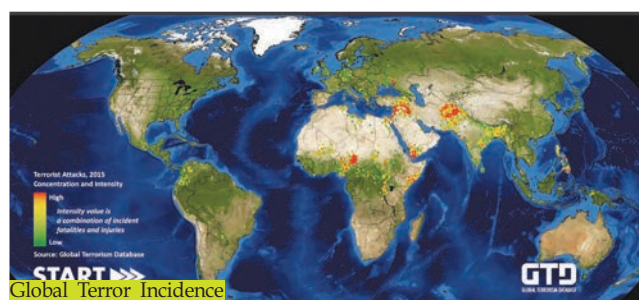
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Cancer-Terrorism Nexus in Cameroon

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The international community has long recognized cancer and terrorism as global challenges. In 2012, according to data compiled by World Health Organization (WHO), there were 14.1 million new cancer cases and 8.2 million cancer-related deaths worldwide. The WHO projects that, by 2035, the world could see 24 million new cancer cases and 14.5 million cancer-related deaths a year.¹ Along the same lines, in the security front, world leaders at the 2016 Nuclear Security Summit in Washington, DC, affirmed, "the threat of nuclear and radiological terrorism remains one of the greatest challenges to international security, and the threat is constantly evolving."² Figure 1, updated in 2016, the Global Terrorism Database (GTD) World Map: 45 Years of Terrorism displays the concentration and intensity (combining fatalities and injuries) of terrorist attacks that occurred worldwide across 45 years of data. The GTD 2016 of the National Consortium for the Study of Terrorism and Responses to Terrorism (START: A Center of Excellence of the U.S. Department of Homeland Security) has marked high concentration and intensity of fatalities and injuries in Africa, Middle East and Asia. Ultimately, when it came to the cancer-terrorism nexus in Low and-Middle-Income Countries (LMICs), the banal assumption was that they are two low priority and unconnected issues. But, as we now know, the real threat of dirty bombs (improvised explosive devices that include radioactive material) and other forms of nuclear and radiologic terrorism, and an enormous shortage of cancer care in LMICs are the driving forces that bring the public health and security communities together. Most African countries including Cameroon belong to the WHO LMICs category.



Introduction

The Government of Cameroon has enacted policies and taken actions aimed to address the cancer-terrorism problem. In 2015, according to U.S. Country Report on Terrorism, countering terrorist threats in the North and Far North Regions remained a top security priority for the Government of Cameroon. On its part, the U.S. Government provided an expanding number of training programs on terrorism and security to help Cameroon tackle the Boko Haram threat in the Far North Region.³ Also, the Government of Cameroon participated in the U.S. White House Summit on Countering Violent Extremism (CVE) in February as well as subsequent CVE meetings. Likewise, as of March 2017, the General Hospital of Douala was using one external radiation beam Cobalt-60 equipment, installed in 1988, and one internal radiation beam Cesium -137 device, commissioned in 1996, to treat cancer patients.⁴ The other institution, the General Hospital of Yaoundé was using one internal radiation beam Cesium -137 device, put to clinical use in 1995.

Despite the fact that the Government of Cameroon made progress in dealing with cancer epidemic and terrorism threat, over the past few years, the Government has been increasingly grappling with two aching trends: increasing numbers of deaths as a result of terrorist incidents and increasing incidence

¹ See <https://www.cancer.gov/research/areas/global-health>

² See <https://pgstest.files.wordpress.com/2016/04/nss2016communiqu3a91.pdf>

³ See <https://www.state.gov/j/ct/rls/crt/2015/257514.htm>

⁴ See <https://dirac.iaea.org/Data/Institute?institute=4572>

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of noncommunicable diseases (NCDs), especially of cancer.⁵ From July 2015 to July 2016 Boko Haram conducted at least 200 attacks, including nearly 40 suicide bombings in the Far North region of Cameroon, which killed at least 480 people (civilian and soldiers), reported Amnesty International in July 2016.⁶ On top of those deaths, cancers figures among the leading causes of morbidity and mortality in Cameroon and WHO records indicates there were at least 8200 cancer related deaths in 2014.⁷ There are three main goals that LMICs including Cameroon can achieve by adopting of state-of-the-art medical Linear Accelerators (LINACs) instead of telecobalt machines for treating cancer.

Radiological security

Adopting linear accelerators instead of cobalt-60 teletherapy units for external beam radiotherapy in Cameroon is one of the most important ways to minimize the prospect of a terrorist attack involving a 'dirty bomb'. By a 'dirty bomb' we mean: one type of a radiological dispersal device (RDD) that combines conventional explosives, such as dynamite, with radioactive material such as cobalt-60.⁸ In Cameroon, the General Hospital of Douala uses a Cobalt-60 device to direct high-energy rays from outside the body into the tumor. One way to reduce the risk associated with the use of the radioactive source is to improve the physical protection of the facility and treatment unit. By contrast, when considering options for improving security, the ideal solution would be to completely remove the radioactive source target – cobalt-60 or cesium-137 – and replace it with a LINAC that generates x-rays electronically.

LINAC can be adopted during upgrade of radiotherapy facilities, expansion of radiation treatment services, or establishment of new cancer treatment centres. There are numerous issues when weighing the possibility of adopting a medical LINAC technology. Therefore, it is important to analyze all of the potential impacts that such a move could have on a hospital's operations. If an institution decides to adopt LINAC, the transition is expected to be as seamless as possible. To achieve this, some international organizations and world governments including

the International Atomic Energy Agency, U.S. Government, and World Institute for Nuclear Security (WINS) provide technical and development assistance to national governments and private hospitals in conducting need analysis and ensuring sustainability, upon request.

Of course, a starting point for all [potential] operators within a country is to consult the nuclear regulatory body, which is the National Radiation Protection Agency (NRPA), in the case of Cameroon. Ideally the option of phasing out cobalt-60 machines in favor of LINAC machines where technically and economically feasible would achieve permanent threat reduction of radiological terrorism. By extension, the number of sites in a country where terrorists, armed merchants and criminal gangs can look for their much-needed ingredient to manufacture a 'dirty bomb' are permanently reduced.

Radiotherapy treatment

On top of security benefits, adopting linear accelerators instead of telecobalt units for external beam radiotherapy in Cameroon would increase patient access to cancer treatment services. In 2016, Cameroon operated only one cobalt-60 teletherapy machine at the General Hospital of Douala to treat the nation's nearly 22 million people.⁹ The unit was installed and put to clinical use in 1988. 28 years in operation as of December 2016, the device has long exceeded its useful lifespan of 15-20 years. Given the ideal ratio of 4-8.1 RT centers per 1 million people or 1 MV per 250,000 people, as defined by the IAEA, Cameroon needs at least 20 additional radiation treatment machines.¹⁰ Figure 2 shows a map of availability of radiotherapy machine per million population around the globe. Directory of Radiotherapy Centres (DIRAC) 2012 of IAEA has grouped Cameroon with poorest Sub-Saharan African countries with less than one radiotherapy machine per million people. Increased patient access to RT cancer treatment services can be achieved in Cameroon by establishing new centres, adding machines to existing centres, and upgrading old outdated devices. This can be done by public and private institutions or Public Private Partnerships.

⁵ See <http://ascopubs.org/doi/full/10.1200/JGO.2016.007591>

⁶ See <https://www.amnesty.org/en/latest/news/2016/06/cameroon-boko-haram-attack-brings-total-killed-to-nearly-500-in-a-year/>

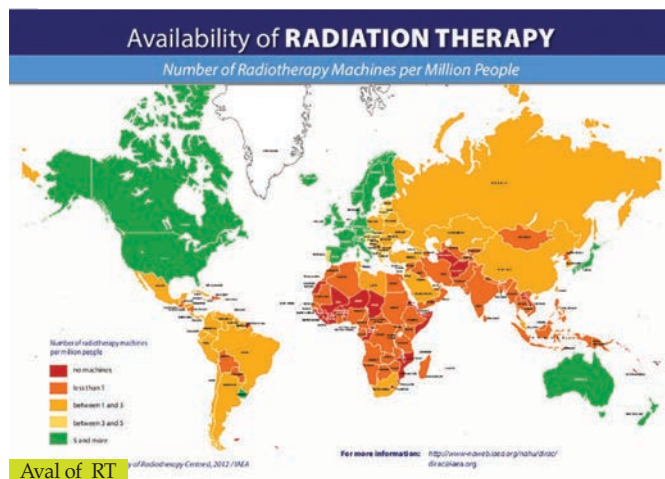
⁷ See http://www.who.int/cancer/country-profiles/cmr_en.pdf

⁸ See <https://www.nrc.gov/reading-rm/doc-collections/fact-sheets/fs-dirty-bombs.html>

⁹ See <https://dirac.iaea.org/Data/Institute?institute=4572>

¹⁰ See <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4302829/#B17>

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Beyond increasing access to cancer treatment services, adopting linear accelerators instead of telecobalt units for external beam radiotherapy would increase quality of cancer treatment services in Cameroon. As a practical pro, a linear accelerator (LINAC) customizes high energy x-rays to conform to a tumor's shape and destroy cancer cells while sparing surrounding normal tissue. Modern LINAC, for instance, has features several built-in safety measures to ensure that it will not deliver a higher dose than prescribed and the medical physicist checks the machine regularly to ensure it is working properly and delivering painless treatment on patient.¹¹ Even more important, the overall treatment delivery time with LINAC is shortened because of marked increase in dose rate compared to using a cobalt-60 device. To that end, a clinic with a fully functional LINAC treats more cancer patients per day than with a cobalt machine. Indeed, the high doses are delivered with precision and accuracy; thereby, causing the cancer cells to lose their ability to reproduce. In fact, it's the agility of the imaging system of a LINAC allows physicians to track the tumor during treatment, even when the tumor moves due to natural breathing patterns.

Although adopting medical advanced radiation therapy equipment yields benefits as explained above, a number of issues stymie LINAC adoption in resource-constrained developing countries like country. First, there is always a concern that huge initial out-lay makes it apparently expensive. And second, unlike Cobalt-60 units, LINAC units require perennial electricity supply and advanced skills to perform Quality Assurance. While start cost and operating skills for LINAC are an issue, the long term operational cost, security benefit, and public

health benefits outweigh them. Our view is that these issues can be managed through informed decisions backed by research and analysis, sharing of best practices, establishing unique-problem solving partnerships, and ultimately Government leadership in creating conditions and environment that attract private public partnership investment in the cancer service sector.

Conclusion

In all, then, as we explained earlier, Governments of Low and-Middle -Income Countries like Cameroon can have it both ways when it comes to the cancer-terrorism nexus: minimizing radiological terrorism and improving cancer care. Permanently reducing radiological terrorism threat through adoption of LINAC over telecobalt devices for external beam radiation treatment, in turn, increases patient access to treatment services and improves quality of services. External beam radiation therapy¹² is the most common type of cancer treatment and, at the present time, many experts estimate that around 60% of new cancer patients and 23% of previously radiotherapy-treated patients need radiotherapy for management of their cancer.¹³

Complacency on radiological terrorism threat has huge consequences to the environment, hospital and Government. If a security event were to occur in a hospital – regardless of its health effects – it has the potential to damage the organization's reputation and open to a range of further liabilities. At a practical level, such an event could disrupt the hospital's regular operations for days or months or even permanently if contaminated areas cannot be cleaned up to an acceptable level. The associated costs for clean-up and the relocation of individuals and businesses could be enormous. More so, depending on the situation, an RDD explosion could create fear and panic among citizens – precisely the desired outcome of terrorists.

Dealing with the public health – security nexus is not an easy feat even for high income countries, and it takes planning, determination, and incentives to attract relevant stakeholders including international initiatives, nongovernmental organizations, professional associations, technology vendors, and other government agencies concerned about nuclear proliferation of high risk cobalt-60 treatment technology. Lessons from Western countries reveal that, Governments that Fortunately, adopt of LINACs offer opportunities to local partnerships, brings about economic development, and promotes international security that contributes to world peace.

¹¹ See <https://www.radiologyinfo.org/en/info.cfm?pg=linac>

¹² See <https://www.cancer.gov/about-cancer/treatment/types>

¹³ See [http://www.journalcancerpolicy.net/article/S2213-5383\(15\)00003-X/abstract?cc=y](http://www.journalcancerpolicy.net/article/S2213-5383(15)00003-X/abstract?cc=y)