Challenges and solutions, advantages and disadvantages of launching 1st 3-Dimensional brachytherapy in a developing war-torn country (Iraq) using Co-60 High Dose Rate (HDR) source

Ghafour, Hawbir O. a; Mula-Hussain, Layth Y. I. b; Wadi-Ramahi, Shada c; Othman, Nyan b; Wahbi, Araz a; Jaradat, Imad d.

a Medical Physics Section, Zhianawa Cancer Center – Kurdistan Board for Medical Specialties.
b Radiation Oncology Program, Zhianawa Cancer Center – Kurdistan Board for Medical Specialties.
c Radiation Oncology Physics Section, Biomedical Physics Department, King Faisal Specialist Hospital and Research Center.
d Radiation Oncology Department, King Hussein Cancer Center.
Introduction:

Brachytherapy (BT) is a well-known part of radiotherapy services for cancer treatment globally and since almost a century and generally can be of low dose rate (LDR) or high dose rate (HDR) through different radioactive isotopes. This service was used to be in Iraqi radiotherapy institutes till 1990s when the wars and embargo started to affect all the aspects of life. Obviously, all the patients who were in need for this modality of treatment have to travel abroad in order to get it. Just recently, this service became available again for free of charge in Iraq.
Results:

- Zhianawa Cancer Center (ZCC) is a public radiotherapy facility established in 2009 in Sulaymaniyah city – Kurdistan – Iraq. ZCC started to approach some companies in order to establish BT. Upon the research, Cobalt (Co) 60 HDR Source was selected to be imported due to similar outcomes and long half-life of the radioactive source that will be make it suitable to our complicated life circumstances. By 2013, the source became available in ZCC with set of Krieger Phantom. However, due to many technical and logistical challenges, the service stayed non-functioning for over three years. By August 2016, the BT service became functioning for gynecological cylinder approach, using Computed Tomography (CT) based simulation, 3-Dimentional (3D) based planning and after-loading based dose delivery.

- The choice of HDR after-loader source (over the LDR) was made as the former is in increasing popularity globally and the fact that our facility is devoid of in-patient care. The long half-life of Co-60 (5.26 years that is more than 26 times that for Iridium (Ir) 192) made it our preference due to the delay in the establishment and change procedures in our working public system. Other advantages are the saving of the quality assurance procedures, machine’s performance tests and transport difficulties that we need at the exchange time.
Results (Cont…)

• Among the challenges that we faced and the solutions that we arranged, we can numerate the followings:

1. Absence of the required expertise in radiation oncology and medical physics sides. With the help of colleagues from Jordan, King Saudi Arabia and Canada, through the remote contact and the voluntarily on-site visits, we could pass this issue. The producer company in Europe also sponsored the visit of its experts for two times.

2. Due to the unavailability of well chamber, the popular approach in measuring source’s activity and inability to get it soon, instead, we used the Krieger Phantom to measure air kerma strength and we found it acceptable.
Conclusions:

• In spite of the difficult challenges, BT was successfully started in Kurdistan – Iraq and to be available for all Iraqi cancer patients free of charge. In this synopsis, challenges and solutions, advantages and disadvantages of using the Co-60 HDR BT were explored.

• The authors believe that this piece of knowledge might be of interest to the colleagues in the international communities who are facing similar challenges.