

MEDICAL PHYSICS STATUS IN YEMEN

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Abstract — The history of medical physics in Yemen first started in October 1996. At that time, the work of physicists in the medical field was unknown and questionable to be accepted. Due to the lack of knowledge on the importance of medical physicists, it was difficult to be employed by the Ministry of Health. The perseverance and the hard work by the pioneer medical physicists succeeded to convince health authority about the importance of this profession and raise awareness among professionals in the medical field. There are still big challenges related to the lack of needed medical equipment and the difficulty in the education and clinical training of medical physicists.

Keywords — Medical Physicist, radiotherapy, nuclear medicine, Education and Training

I. INTRODUCTION

Yemen, as many other low and middle income countries, is beginning to face a double health burden: while communicable diseases are highly prevalent, non-communicable diseases are increasing and the country needs to prepare many different aspects for its control. Cancer incidence and burden in Yemen is increasing and is expected to double by 2030. As the number of cancer cases continues to grow in Yemen, capacities to treat patients remain underdeveloped and limited. The country's only cancer therapy centre, located in Sana'a, relies on two radiotherapy machines [1], too few to cater for the population of over 30 million [2]. The financial resources in health planning dedicated only 5% for cancer of the annual health care budget, a disease known for its associated high costs of diagnosis and control.

Cancer has emerged as a major public health concern in Yemen. According to World Health Organization (WHO), International Agency for Research on Cancer Globocan 2020 estimates, the number of new cancer cases expected annually in Yemen is 16,476; with 7,159 new cases among men and 9,317 among women, and the number of death was (9,061) cases. [3]

During the supply of a 6MV Linear accelerator and a simulator in 1995, there were no specialized cadre in radiotherapy nor medical physicists to handle the machines and therefore they were stored in one of the warehouses at the Ministry of Health and they got badly damaged due to the long time storage.

This incident was the first step to realizing the importance and the demand for medical physicists in Yemen.

II. INFRASTRUCTURE

The country has experienced several and different stages of development in terms of availability of machines and equipment related to radiotherapy, nuclear medicine and diagnostic radiology, for example, in public sector; two Cobalt 60 machines, and two brachytherapy. Due to the inability to import radioactive sources caused one of the Cobalt 60 machine and the two brachytherapy machines to become out of service.

In private sector two linear accelerators without MLC were installed, recently one of them got out of service due to the country's current situation.

The current situation of the country has also caused the nuclear medicine system to be out of services, and the inability to import radioactive sources and maintenance of equipment and machines.

Because of the urgent need for these devices and equipment, tremendous efforts are being made to develop the health sector and purchase needed equipment in the field of radiotherapy, diagnostic radiology and nuclear medicine.

Table shows medical equipment that are currently available in the country and are still functioning.

Table 1 Medical equipment for radiotherapy, diagnostic radiology and nuclear medicine

Equipment	Total
Co-60	1
Linear accelerator	1
Gamma camera	2
Dose calibrators	2
CT	70
Fluoro. C-Arm and Cath. lab.	>500
Mammography	50
Standard Radiology	>1000
Interventional	40
MRI	30

III. REGULATION OF MEDICAL PHYSICS

The legislative basis for radiation safety is provided through Decree No. 126, 1999 [4], which establishes the National Atomic Energy Commission (NATEC) as the sole Regulatory Authority, and NATEC Decisions No. 1 and 2,

which adopt the IAEA Basic Safety Standard (BSS) as the national regulation for radiation safety in all practices including medical exposure. Within this regulatory framework in the country, it requires the presence of Medical Physicists in any radiotherapy center or any nuclear medicine center. Unfortunately for diagnostic centers due to the lack of specialized staff, there is some relaxation. Table 2. shows the available staff in this medical field.

Table 2 Distribution of medical physicists in Yemen

Medical Physicists	Male	Female	Total
Radiotherapy	3	--	03
Radiation Physicists	5	1	06
Diagnostic Radiology	2	--	02
Nuclear Medicine	5	--	05
Outside the country	3	5	8
Total	18	6	24

IV. EDUCATION AND TRAINING

Medical physics education and training in Yemen is based on BSc degree in Physics and postgraduate degree abroad, followed by a two-year internship.

At the national level, there are no proper medical physics education and training program available in Yemen. Currently, in the country has one program at Ibb University for BSc. in Applied Physics (Medical).

Clinical Training program at the National Oncology Center (NOC), which is concerned to train graduates of Ibb University in the field of radiotherapy physics, in addition to training graduate from Sana'a University - health physics department in field of dosimetry, quality and radiation protection. There are also future plans to expand this clinical training program into academic and clinical training to meet the needs of diagnostic, radiotherapy and nuclear medicine centers of qualified and well-trained cadre.

V. CONCLUSION

The country difficult economic status and the low income of Medical Physicists has encouraged most of the employees to migrate and prefer to work abroad. The number of known employees outside the country is more than half of those in the country as indicated in Table 2.

It is worth mentioning that the absence of advantages and benefits besides the scarcity of workshops and short training courses deprived the existing staff in the Medical physics

field has also been a factor encouraging migration. This makes it difficult to retain qualified personnel in the country.

Despite all these circumstances, the situation will hopefully be better and in the near future will hopefully embrace new cadres of medical physicists, and until then the symphony of medical physics will continue to play silently.

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