

# MEDICAL PHYSICS STATUS IN SULTANATE OF OMAN

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**Abstract** — Medical physics is a relatively young profession in Oman, but we have seen encouraging development in the last decade. There are currently 36 medical physicists in Oman, making a ratio of 6.6 medical physicists per a million population. Oman currently has one medical physics professional organization named Oman Medical Physics society under the umbrella of the Middle East Federation of Organizations for Medical Physics (MEFOMP) and the International Organization for Medical Physics (IOMP). Since 2004, Oman offers a Medical Physics program as a minor within the Physics program at a BSc. Level at Sultan Qaboos University. Training and educating Omani medical physicists, with a pathway to a career in radiation oncology, diagnostic imaging and nuclear medicine, has been witnessed over the years. This is to provide highest international standards of patient care, radiation safety and clinical practice.

**Keywords** — Medical Physicist, Oman Medical Physics Society, Education and Training

## I. INTRODUCTION

One of Oman’s vision for the future, “Oman 2040”, is “A Leading Healthcare System with International Standards”. Its strategic plan aspires for qualified national talents and capabilities leading scientific research and innovation in healthcare [1].

Oman’s healthcare sector continues to grow and advances with diagnostic imaging services and therapeutic procedures with state of art equipment including a recently installed Cyber knife at Sultan Qaboos Comprehensive Cancer Center- Research Centre (SQCCC-RC), which is expected to start its services by the end of 2021. In addition to SQCCC-RC, Oman has a National Oncology Center at the Royal Hospital which started treating its first patients in 2003. Table 1. reflects equipment from Sultan Qaboos University Hospital (SQUH), The Ministry of Health (MOH) and SQCCC-RC where all comprehensive, state-of-the-art diagnostic radiology, image-guided interventional services, and nuclear medicine services are offered. However, medical physics services are further extended to other government and private hospitals and centers in the country.

For occupational radiation safety, there are two Personnel Thermo-luminescence dosimetry laboratories in Oman in Sultan Qaboos University (SQU) and in Ministry of Health. Both laboratories are run by medical physicists.

Table 1 Medical equipment for medical imaging, nuclear medicine and radiation therapy (as of April 2021) in SQUH, MOH and SQCCC-RC, excluding other government and private hospitals and centers.

Equipment	Total
<b>Radiation Oncology</b>	
LINAC	4
Cyberknife	1
Brachytherapy	1
<b>Nuclear Medicine</b>	
Gamma Camera	1
SPECT	3
SPECT/CT	3
PET/CT scanner	3
Medical Cyclotron	1
<b>Diagnostic Radiology</b>	
MRI systems	8
CT scanner	28
Mammography	14
Standard Radiology	200
Fluoroscopy and angiography systems	80
Bone Densitometry	3

Abbreviations:

LINAC: Linear accelerator

SPECT: Single photon emission computed tomography

CT: Computed tomography

PET: Positron emission tomography

MRI: Magnetic resonance imaging

## II. MEDICAL PHYSICISTS

Medical physics is a relatively young profession in Oman, but has seen encouraging development in the last decade. As of 1st April 2021, there are 36 medical physicists in the country in which 32 are Omani nationals. The population of Oman is approximately 5.2 million people. This makes a fair ratio of 6.6 medical physicists per a million population.

Medical physicists in Oman are mostly employed in hospitals and provide a wide range of services to radiation oncology, diagnostic radiology and nuclear medicine. Ministry of Health has a Medical Physics department and an Occupational Health department where some of our medical physicists are employed as well.

There are a number of medical physicists at Sultan Qaboos University and Sultan Qaboos University Hospital in the medical physics unit, where teaching, personnel dosimetry, gamma spectroscopy analysis and cross calibration of survey meters take place. Academic and clinical medical physicists at Sultan Qaboos University contribute in research, mainly in the topics of patient dose optimization, imaging related projects and radiation protection [2]. A number of research

papers and outcomes were presented at scientific meetings and international conferences and published in local and international journals.

To meet the increased demand in radiotherapy services and the need for more qualified medical physicists in the diagnostic departments of radiology and nuclear medicine, there are currently 4 PhD holders, one currently pursuing a doctorate degree and 11 MSc. holders. Table 2. demonstrates the current distribution of medical physicists in Oman in Medical Physics sub-fields.

The proportion of female physicists has been growing since 2003 presenting 82% of the workforce in all medical physics disciplines. This trend is expected to continue, supported by the number of women enrolled in Medical Physics program in Sultan Qaboos University each year.

Table 2. Distribution of Medical Physicists in Medical Physics sub-fields as of April 2021 (Including 4 PhD, 11 MSc.).

Specialty	Number of Medical Physicist	Female	Male
Diagnostic radiology	11	8 (73 %)	3 (27 %)
Radiation oncology	7	6 (86 %)	1 (14 %)
Nuclear medicine	10	10 (100 %)	0 (00 %)
Health Physics	3	2 (67 %)	1 (33 %)
Academia	3	1 (33%)	2(67 %)
Research assistance	2	2 (100%)	0
Total	36	29	7

### III. GRADUATE TRAINING

For PhD. and MSc. degrees in medical physics, we currently depend on external academic Medical Physics programs. However, since 2004, Sultan Qaboos University in Oman offered Medical Physics program as a minor within the Physics program at a BSc. Level. A three semester medical physics program is designed and taught in the Medical Physics Unit, Department of Radiology and Molecular Imaging at College of Medicine and Health Sciences. The program covers mainly the following topics: Physics of ionizing and non-ionizing radiation of diagnostic imaging modalities and nuclear medicine, radiobiology and radiation protection. Practical sessions and research projects of the program are conducted within Sultan Qaboos University and Sultan Qaboos University Hospital with the supervision of senior staff and qualified medical physicists. Two weeks of hospital based training is included as well within the syllabus. Since 2004 to date, an average of 10 candidates graduate every year.

### IV. CLINICAL TRAINING

Currently, there is no medical physics residency program in Oman. However, two of our radiotherapy medical

physicists underwent an accredited residency program abroad and one is yet to complete the program. Some of our nuclear medicine physicists underwent specialized training programs at certified centers abroad. In addition, most of our medical physicists are trained on-the-job after obtaining their undergraduate and postgraduate degrees.

Moreover, our medical physicists are encouraged to obtain the International Medical Physics Board Certificate (IMPBC) where one of our diagnostic medical physicist has been certified in 2019 and one of our radiotherapy medical physicist passed the first two phases.

The Peaceful Nuclear Technology Office in Oman in collaboration with the International Atomic Energy Agency (IAEA) further support Omani medical physicists on strengthening their education and clinical training through Technical Cooperation (TC) programs, national, regional and international workshops and fellowships.

IAEA is also supporting Omani candidates to join the Post Graduate course on Advanced studies in medical physics program from International Center for Theoretical Physics (ICTP), Trieste, Italy, where one of our diagnostic medical physicist has graduated in 2019.

As part of the radiology residency program at Oman Medical Specialty Board (OMSB), a comprehensive radiation physics program is taught covering all aspects of physical principles of diagnostic imaging equipment, nuclear medicine, radiotherapy, radiobiology, and radiation protection. This program is delivered by our trained medical physicists to first year radiology residents.

For continuous education and self- development, the Medical Physics Unit at Sultan Qaboos University, Ministry of Health and Oman Medical Physics Society play an important role in delivering lecture based and hands-on workshops.

Similar to many other countries in the region, our main challenge in Oman is the lack of a certified residency program on medical physics and lack of academic programs for MSc. and PhD. levels.

### V. OMAN MEDICAL PHYSICS SOCIETY (OMPS)

Oman currently has one medical physics professional organization, Oman Medical Physics Society (OMPS), under the umbrella of the Middle East Federation of Organizations for Medical Physics (MEFOMP) and the International Organization for Medical Physics (IOMP).

OMPS was founded in 2011 with more than 40 members up to date. The main goals of the OMPS are: To promote cooperation and communication between medical physicists

locally and between medical physics organizations in the region. To promote medical physics and related activities in the country and to promote the standard of practice of the medical physics profession through conferences, workshops and seminars. In addition, OMPS seeks to create public awareness of the Medical Physics profession in Oman and to encourage research, training and education in the field.

The society is also responsible for the annual celebration of the International Day of Medical Physics (IDMP) and International Medical Physics Week (IMPW).

On September 2019, the society was delighted to host the 1<sup>st</sup> MEFOMP workshop in Oman and on 7<sup>th</sup> of November 2019 organized the 1<sup>st</sup> gathering of Medical Physicists in Oman with a local Radiation Protection workshop. Most recent, the OMPS participated in the 2021 Virtual MEFOMP Medical Physics Conference.

## VI. CONCLUSION

The demand for training medical physicists in Oman increased by year in line with the rapid development in the healthcare services, which aims to operate at the highest international standards of patient care, radiation safety and clinical practice.

This is a result of the improving recognition of the important role of medical physicists in Oman, especially in

areas of Radiotherapy, Nuclear Medicine and Diagnostic Radiology.

## REFERENCE

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