MEDICAL PHYSICS IN THE REPUBLIC OF THE PHILIPPINES

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ABSTRACT

The Republic of the Philippines is an archipelagic state in South East Asia with a land area of 300,00 sq km. It has an estimated population for 2020 of 109,947,900. With such a big population, it is most important that a sufficient number of health care personnel is available in the country to provide appropriate services. Unfortunately, for medical physicists, the current number is not enough. There is also only one university in the country offering the master's program in medical physics. In this paper, the development and current status of medical physics in the country will be presented.

Key words: Philippines, medical physics, status, challenges, education, training

I. BACKGROUND

The Republic of the Philippines is an archipelago of about 7,641 islands (1) including the Philippine Sea in the north and the east, the West Philippine Sea in the west, and the Sulu Sea in the south. It is located in South East Asia and its nearest neighbors are Brunei, Malaysia, Indonesia, Vietnam, and Taiwan. It has a land area of 300,00 sq km. It has an estimated population for 2020 of 109,947,900 (2) of which 50.4% are male and 49.6% are female. The age group 24 years old and below comprises 48.7% of its population, while the age group 60 years old and above comprises 8.6% of its population. Its gross domestic product in 2019 was US $355.50 billion. (3)

With such a big population, it is crucial for the Philippines that a sufficient number of health care personnel is available to provide appropriate services. Unfortunately, for medical physicists, the current number is not enough. In this paper, the development and current status of medical physics in the country will be presented.

II. AVAILABLE MAJOR EQUIPMENT

Radiation medicine equipment is among the most costly equipment used in a hospital. In the Philippines, both the government and private sectors have invested in such equipment. Tables 1 – 3 below show the distribution of selected types of equipment in the country. (4,5)

Table I: Radiotherapy Equipment

ExternalBeam Radiotherapy	66
Brachytherapy	31
Simulator (CT sim)	48

Table 2: Diagnostic Radiology Equipment

General radiography	2593
Fluoroscopy/interventional radiology	309
Computed Tomography	354
Mammography	137
Dental x ray	217

Table 3: Nuclear Medicine Equipment

SPECT	10
SPECT-CT	10
PET-CT	12
Gamma Camera	0
Cyclotron	4

III. THE FIRST STEPS

The first Filipino medical physicist was Mr. Luciano N. Niguidula. He was employed by the government – owned Philippine General Hospital (PGH), at first as an engineer in the Radiology Department. In 1963, PGH acquired a cobalt-60 teletherapy unit. Dr. Harold Cook, a medical physicist from the UK, came to Manila as an International Atomic Energy Agency (IAEA) expert to train Mr. Niguidula in radiation dosimetry and treatment planning. Mr. Niguidula worked in radiation oncology medical physics well into his late eighties and trained the older generation of Filipino medical physicists.

In the 1970's, Rizal Medical Center, another government hospital employed the first Filipino physicist in a nuclear medicine department. In the 1980's, Makati Medical Center became the first private hospital to employ a fulltime medical physicist for its radiation oncology department. In the 1990's, The Medical City, a private hospital was the first hospital to employ a fulltime medical physicist in diagnostic radiology.

Any new profession needs a strong advocate. In the Philippines this person was Dr. Celia T. Anatalio, a radiologist and a radiation oncologist, who is considered the Mother of Medical Physics in the country. She was the first director of the Radiation Health Office (RHO) of the Department of Health which was created in 1974.

IV. THE ROLE OF THE REGULATORY AGENCIES

The Philippines has two national radiation regulatory agencies – the Philippine Nuclear Research Institute (PNRI) of the Department of Science and Technology (DOST) and the Center for Device Regulation, Radiation Health, and Research (CDRRHR) of the Food and Drug Administration of the Department of Health (DOH). PNRI used to be the Philippine Atomic Energy Commission while CDRRHR used to be the Radiation Health Office. PNRI regulates radionuclides while CDRRHR regulates electrical or electronic devices emitting radiation, and other medical and health-related devices.

Both agencies have worked closely in the development of medical physics in the country. The MSc in Applied Physics, major in Medical Physics, program was established in 1981 as a joint project of the DOH, DOST, and the University of Santo Tomas Graduate School (USTGS), with technical assistance from the International Atomic Energy Agency. The DOH was also able to tap the World Health Organization (WHO) Western Pacific Regional Office (WPRO) and the Colombo Plan for fellowship grants to enable three young DOH physicists to take up their MSc in Medical Physics degrees abroad (Aberdeen University, University of Surrey, University of Wisconsin-Madison). Upon their return to the country, they became part-time faculty members in the program while working fulltime for the DOH. Both regulatory agencies have also collaborated in the implementation in the country of IAEA projects in medical physics and radiation protection.

Regulations issued by the PNRI [for cobalt 60 external beam radiotherapy (EBRT), brachytherapy, and nuclear medicine facilities] and by the CDRRHR [for EBRT using linear accelerators and tomotherapy equipment] triggered the employment of medical physicists by these facilities. The existing CDRRHR regulations for EBRTs and diagnostic radiology facilities are currently undergoing revision. It is expected that the requirement for the employment of diagnostic radiology medical physicists will be incorporated in the revised regulation for diagnostic radiology facilities while that for EBRT will be amended.

V. EDUCATION AND TRAINING

In June 1981, the two-year MSc in Applied Physics, major in Medical Physics, program began in the University of Santo Tomas Graduate School. The program started with four students; three of them were employed by the DOH. These three are currently still active in medical physics.

However, the first graduates of the program completed all their academic requirements only in 1986. The IAEA project for the program needed a medical physicist expert who could stay not just for a few weeks but for at least a year to serve as a faculty member and as the thesis adviser of the students. This assignment was accepted by Dr. Lars-Eric Larsson from Sweden who was then newly-retired.

In 2004, USTGS established a second master's degree program, the Master in Medical Physics course with no thesis requirement but with additional units to replace the thesis writing units. For both programs, the incoming students have educational backgrounds in physics, applied physics, engineering, chemistry, and physics for teachers.

From 1986 to 2019, both programs produced a total of 164 graduates. The first graduate of the MSc program was Mr. Marlon Raul Tecson. From 1986 to 1999, there were nineteen (19) graduates. During the period 2000 - 2019, there were 145 graduates.

Through the IAEA Regional Cooperative Project (RCA) RAS 6038, structured clinical training programs in

radiation oncology medical physics (ROMP), diagnostic radiology medical physics (DRMP), and nuclear medicine medical physics (NMMP) were established in the country. Implementation of the residency training programs in the country was enhanced with the IAEA RCA RAS 6077 project using the advanced medical physics leaning environment (AMPLE) platform. It enabled supervision at a distance because, in many instances, the resident and the supervisor are not based in the same hospital, nor even in the same city or island.

IAEA fellowships have also enabled Filipino medical physicists to undergo short-term training courses or workshops abroad such as those held in the Abdus Salam International Center for Theoretical Physics in Italy or in other countries.

There have also been short-term workshops hosted locally by the DOH, the DOST, the Philippine Radiation Oncology Society, and private medical centers, especially St. Luke's Medical Center, in cooperation with the IAEA, the WHO WPRO, the International Organization for Medical Physics (IOMP), the South East Asian Federation of Organizations for Medical Physics (SEAFOMP), the Asia-Oceania Federation of Organizations for Medical Physics (AFOMP) , the American Association of Physicists in Medicine, the American Society for Radiation Oncology, and the European Society for Radiotherapy and Oncology.

VI. THE PROFESSIONAL SOCIETY AND CERTIFICATION

The Philippine Organization of Medical Physicists (POMP) was established in 1986. It became a member of IOMP in 1986 and a founding member-organization of SEAFOMP and AFOMP in 2000. In 2016, POMP became the Society of Medical Physicists in the Republic of the Philippines (SMPRP).

Under POMP, now SMPRP, the first certifying board examination in ROMP was held in 2010 with Dr. Brendan Healy, from Australia, as the external examiner and Ms. Lilian Vidal-Rodriguez as the local examiner. There are now twenty (20) board certified ROMPs.

Under SMPRP, the first certifying board examination in DRMP was held in 2019 with Dr. Ian Donald McLean, also from Australia, as the external examiner with Ms. Agnette Peralta, Mr. Bayani San Juan, and Ms. Aida Lobriguito as the local examiners. There are now thirteen (13) board certified DRMPs.

The board examination for NMMPs is still being planned.

VII. MAJOR CHALLENGES

During the first twenty years of the USTGS academic program, the low number of MSc students in the medical physics program was the first major challenge. Partial scholarships were available from DOH and DOST but these were awarded only to their qualified employees. In the latter part of the third decade of the program, the DOST expanded its fulltime scholarship program for graduate degree courses, and medical physics was included among the fields. With this development, more students were able to enroll in medical physics as fulltime students. Private sector scholarships have also been made available. A local supplier of linear accelerators sponsored three scholars. Private investors or hospital owners who want to put up radiotherapy or nuclear medicine facilities have employed young BSc physics or BSc engineering graduates and awarded them scholarships to enroll in the MSc program.

The small number of graduates was the second major challenge. The MSc thesis requirement was an impediment for graduation of students who were mainly working students. Several of them worked fulltime in radiotherapy facilities and, due to their workload and the distance of their hospitals from UST, were unable to complete their schooling. Thus, USTGS established a second program, the non-thesis Master in Medical Physics degree program.

Because UST is located in Manila, most students are based in the National Capital Region. The third major challenge is the establishment of more master's programs in medical physics. Currently three universities, one of them in Mindanao, have plans to do so.

The fourth major challenge was the lack of positions for medical physicists. This is not the situation anymore. In 2014, with the DOH plan to establish radiotherapy and nuclear medicine facilities in most of its regional hospitals and medical centers, many positions for physicists in DOH hospitals were created.

The fifth major challenge is the shortage of medical physicists in the country. This situation has limited the number of radiotherapy and nuclear medicine facilities being established in the country.

The sixth major challenge for hospital-based medical physicists is their workload. Administrative work is added to their already very heavy clinical workload. When combined with the mentoring of medical physics residents, the clinical supervisor is left with no more time to do research. This situation has also resulted in a shortage of clinical supervisors for residency training of medical physicists.

The seventh major challenge is the recognition of the important role of medical physicists; this has mainly already been overcome. After Dr. Anatalio's retirement, her successor was Ms. Agnette Peralta, the first medical physicist director of RHO. She was then succeeded by another medical physicist, Mr. Bayani San Juan.

The SMPRP also works closely with the Philippine Radiation Oncology Society (PROS), the Philippine College of Radiology, and the Philippine Society of Nuclear Medicine. In 2003, Ms. Lilian Rodriguez became the first medical physicist to be the examiner in the physics portion of the certifying examination of the PROS Board of Radiation Oncology. The Board of Radiologic Technology (BORT) of the Professional Regulation Commission has had a medical physicist as a member of the BORT since its creation in 1992. Ms. Eulinia Valdezco was the first medical physicist BORT member.

However, there is still a need to make the rest of the medical and paramedical professionals and the rest of the population realize the importance of medical physicists in health care.

VIII. CURRENT STATUS OF MEDICAL PHYSICS

Medical physicists in the Philippines have post graduate educational backgrounds in medical physics or physics. Most of them possess a master's degree in medical physics from the University of Santo Tomas Graduate School or have earned at least twenty academic units in the same program. Five received their master's degrees in medical physics from foreign universities. Four of them have doctoral degrees in physics, two from a local university and two from overseas universities.

Filipino medical physicists who live in the Philippines work in private and government hospitals and free-standing health-care facilities, two national radiation regulatory agencies, three private firms providing medical physics services, six multi-national companies, and three universities.

There are currently one hundred-ninety (190) medical physicists active in the different fields of medical physics in the country with one hundred thirty-seven (137) working fulltime in health care facilities. The hospital employing the most number of medical physicists is St. Luke's Medical Center with a total of thirteen in their two branches. Twenty health facilities employ at least three medical physicists each. Those medical physicists who have left the country to work and live abroad, or who have stayed in the country but are not active in medical physics anymore are not included in Table 4 below.

Table 4: Subfields of Medical Physics

Radiation Oncology	106
Diagnostic Radiology	23
Nuclear Medicine	8
Others (radiation protection, related fields)	53
TOTAL	190

IX. CONCLUSION

Establishment in the Philippines of the master's program in medical physics was a major step in responding to the need for medical physicists in the country. Medical physics has become an attractive field for BSc Physics, Applied Physics, Engineering, Chemistry, and Physics for Teachers degree holders. However, there is still a shortage of medical physicists in the country. Moreover, there is a lack of awareness of the medical physics profession among the other healthcare specialties.

Board certification, regulation by the national radiation regulatory agencies, support from the government and private sectors, technical assistance from IAEA, WHO, and national, regional and international professional organizations, and recognition by radiation medicine physicians in the country have all contributed greatly to the current status of medical physics in the Philippines.

Most important of all, the Filipino medical physicists through their professionalism and excellent work have proved their worth in modern medicine and society.

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Photo above: IAEA expert Dr. Brendan Healy with two Board-certified ROMPs, Mr. Jonathan Corpuz and Mr. Teofilo Hermoso in 2010

Photo to the left: National Congress on Medical Physics of the Society of Medical Physicists in the Republic of the Philippines taken on 30 January 2020 at the Heritage Hotel Manila

Photo to the left: Oathtaking of the first batch of Board-certified DRMPs administered by DOH Undersecretary of Health and FDA Director-General Dr. Rolando Enrique Domingo held on 7 November 2019 at the East Avenue Medical Center Auditorium, Quezon City