



South Asia Centre for Medical
Physics and Cancer Research

SCMPCR

Newsletter

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MOTTO: Quality Education and Health Science for Patient Benefit

Inside this issue

- Page 1
Hands-on Workshop (HW5)
- Page 3
SCMPCR Expert Suport
- Page 4
Physicist from Bhutan
- Page 5
Breast Cancer Awareness Program
- Page 6
Co-operation of MP in South Asia
- Page 7
Participation in DGMP2019
- Page 8
German BME Visit to Bangladesh
- Page 10
Digitalization in Radiation Oncology
- Page 12
FLASH Radiotherapy
- Page 13
Breast Cancer Treatment
- Page 17
Medical Physics in Rwanda
- Page 19
The Inaugural of SLMPS
- Page 20
SLMPS Hands-on workshop on DR
- Page 21
Medical Physics in Pakistan
- Page 22
Experience of IMPCB

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It is my great pleasure to extend heartfelt greetings to the readers of the Volume 2, Issue 1 of the SCMPCR Newsletter. You can find here scientific articles, news, events, awards and other aspects of medical physics development across the South Asian countries. The shortage of qualified medical physicists (QMP) is almost acute in South Asia. SCMPCR works for the development of QMP through training and CPD accredited program. The SCMPCR organises regularly training programs for all cancer treatment related personnel including medical physicists, radio Oncologists and technicians. It also organises awareness, prevention and screening program for cancer disease. Every single country should do her best to develop medical physics but a regional co-

operation is necessary. SCMPCR has stated its journey which is a small step for us but a big step for development of medical physics in South Asia future. I appreciate the teamwork and full dedication of the newsletter editors, board members and the staff of the SCMPCR and look forward for their continuous support in the next issues. My dear Reader, Colleagues und Scientists, we request you to contribute this newsletter by sending articles, reports and other information from South Asia and beyond to make the Newsletter more attractive and fruitful. I wish all you a happy, healthy and peaceful new year 2020.

Thank You

Prof. Dr. Golam Abu Zakaria
Chairman, SCMPCR

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Take Home Inspiration from a Combined Workshop HW-05 of AAPM & SCMPCR at Dhaka, Bangladesh

By Mr. Karan Bhateja

The South Asia Centre for Medical Physics and Cancer Research (SCMPCR) is a common platform in South Asia which aims to advance cancer care practice and promoting the best quality treatment techniques & services to the cancer patients. It was established not only to focus cancer research but also to prevent cancer and to train medical physicists for the best possible cancer treatment with all fair practices. The SCMPCR is also an autonomous body under Alo Bhubon Trust (ABT) & non-profit public partnership

which highly encourages public awareness programs especially in women regarding the screening and prevention of cancer treatment.

From 2th to 4th of October 2019, SCMPCR organized a hands-on workshop (HW-05) entitled "Dosimetry of Small Fields in External Beam Therapy: Reference and Relative Dose Determination" in Dhaka, Bangladesh. The aim of this workshop is to enhance & develop the theoretical & most importantly the Practical knowledge in small field dosimetry.

The workshop was commenced with a warm welcome speech by Prof. (Dr.) G. A. Zakaria (Chairman & Chief Medical Physicist at Gummersbach Hospital - University of Cologne, Germany), Prof. (Dr.) Jan Seuntjens (Director & Principle Investigator - Medical Physics Unit, McGill University Health Centre, Canada) and Prof. (Dr.) H. A. Azhari (Dean, Faculty of Physical & Mathematics Sciences &

Chairman, Dept. of MPBME at Gono Bishwabidyalay University, Dhaka) at SCMPCR training classroom. They were also the part of group of trainers. Other trainers in the group were Mr. K Kanakavel (Asst. Manager- Medical Physics & Application Support for PTW India) and Mr. Karan Bhateja (Sr. Customer Support Engineer, PTW India).



"We, PTW India, would also like to thank SCMPCR and its members to invite us to play an active role in this workshop. We also extend our courtesy and gratitude to them for their beautiful and amazing hospitality during our stay these days (specially can't forget to mention the excellent & delicious taste of Rosogolla and Sweet Yogurt). Here, we look forward to work together extensively to take South Asian region to maximum heights in cancer care, prevention and the best cancer treatment facilities & its QA. We, PTW India, also like to take opportunity to congratulate everyone involved being from SCMPCR supporting staff to chairman and from NICRH staff to the director making this workshop a very successful with their hard work, willingness and commitment"

Mr. Karan Bhateja
Sr. Customer Support Engineer, PTW India.



"Excellent Hands-On workshop on small field dosimetry, which is current needful in the field of Medical physics. It greatly expanded our knowledge. Thank you very much for giving me the opportunity to participate in this workshop"

Dr. Vijitha Ramanathan
Senior Lecturer, KDU,
Sri Lanka



Participants of SCMPCR 5th hands-on workshop (HW-05) on "Dosimetry of Small Fields in External Beam Therapy: Reference and Relative Dose Determination" held in Dhaka, Bangladesh from 2 to 4, October 2019.

There were over 24 participants in the workshop invited from South Asian countries (Bangladesh, India, Nepal, Sri Lanka, and Bhutan). It all started with great enthusiasm, expectation, eagerness to learn and motivation of participants and trainers.

On Day 1, after the welcome speech, scientific sessions on basic dosimetry concepts and conventional reference dosimetry was conducted by Prof. Jan Seuntjens. He also conducted sessions on physics & challenges of small field photon beams; IAEA/AAPM TRS-483 COP for dosimetry of small fields photon fields following to machine – specific reference field (fmsr) dosimetry of photon small fields.

Another attractive session was conducted by Prof. G. A. Zakaria on small field detectors which play a very important role especially when it comes to small field dosimetry and comparison of German DIN – 6809-08 and IAEA/AAPM TRS-483 protocols for small fields. There was also a very useful session on practical tricks and tips for relative measurement in small fields conducted by Mr. K Kanakavel. It covered the necessary, recommended and error-less set-up to make for doing such dosimetry in small fields using PTW dosimetry equipment.

Day 2 was allocated only for the practical sessions at the National Institute of Cancer Research and Hospital (NICRH) in Dhaka, Bangladesh. The NIRC was established in 1982 by GoB and then shifted to present location in 1986 and renamed in 1994 because it was



Practical Demonstration at NICRH in Dhaka, Bangladesh.

earlier known as Medical College Hospital. It is the only specialized government institute and tertiary level cancer hospital in Bangladesh engaged in multidisciplinary cancer patient management.

The day at the NIRC started with the inspirational and growth – orientated speech by the Director of the NIRC, Prof. (Dr.) Md. Moarraf Hossen. He welcomed trainers and participants with great heart and appreciation. The NIRC equipped with the latest BEAMSCAN TBA/RFA system available with a variety of different chambers from very small to large volume from PTW dosimetry such as microDiamond, Semiflex 3D, Pin Point 3D, Farmer Chamber and many others. Participants were divided into 2 groups to

make the practical session a productive way and informative to them. One Group was assigned the task to measure reference dosimetry using the BEAMSCAN TBA system under Prof. G.A. Zakaria & Mr. K Kanakavel on one LINAC. The second group was assigned to measure absorbed dose determination at Z_{max} for both standard reference fields and msr field (fmsr) under Prof. Jan Seuntjens & Mr. Karan Bhateja. In the second half, after the lunch break, these groups were swapped.

Additionally, field output factors for the small field photon beams in a water phantom were measured. Both the groups were instructed to prepare a separate presentation of the results of measurements done using different detectors and make a comparison chart out of it. Finally, an open discussion was arranged to answer the questions from the participants and to exchange the practical experiences between all participants.

The 3rd day began with a scientific session on small field in TPS and uncertainties in small field dosimetry which were conducted by Prof. Jan Seuntjens followed the examination in the SCMPCR training classroom. The increased level of understanding and knowledge of participants have made this workshop a successful event and excellent feedback received from the participants has increased the motivation level of resource persons. The workshop was concluded with a closing ceremony and distribution of certificates to participants and receiving mementoes from the SCMPCR Chairman & its other members.



"I am satisfied with the SCMPCR hands-on workshop on Dosimetry of Small Fields in External Beam Therapy: Reference and Relative Dose Determination. The workshop applies to my job. The program was well-placed within the allocated time. The materials have been presented in an organized manner. The instructors were knowledgeable about the topic. I would be interested in attending a follow-up, more advanced workshop on the same subject. I am satisfied with how the workshop was facilitated. The materials provided were very helpful. During the program, questions were encouraged. And presenter and presentations were effective. But there was a drawback about the length of the program. The length of the practical training needs to be improved a little so that the program is more sufficient. The overall visuals, acoustics, meeting space, handouts were excellent".

Mr. Ramu Ragendran
Chief Medical Physicist, Jigme Dorji Wangchuck National Referral Hospital (JDWNRH), Bhutan

An initiative of regional co-operation with providing expert support service through SCMPCR to Bhaktapur Cancer Hospital in Nepal

It is well known that Nepal and Bangladesh enjoy excellent bilateral relations ever since the establishment of diplomatic relationships on 08 April 1972. The relations between the two countries are based on cordiality, goodwill, mutual understanding, and cooperation. In 2019, regional cooperation to provide expert support services to Bhaktapur Cancer Hospital, Nepal was established by SCMPCR. Under this regional cooperation, on request of Dr. Ujjwal Chalise, Head of the Department of Radiation Oncology at Bhaktapur Cancer Hospital, SCMPCR arranged an expert for commissioning of their newly installed Linear Accelerator which is located in Bhaktapur, Province No. 3, Nepal and operated by the Nepal Cancer Relief Society (NCRS) with the support of the Nepalese Government and Rotary International. The hospital already equipped with a telecobalt machine. Recently a Varian Clinac-IX Linear Accelerator was installed for advance radiotherapy treatment and waiting for commissioning procedures before starting the treatment.



"I must say thanks to Head of Medical Physics Department, Bhaktapur Cancer Hospital, Nepal, Mr. Bidaypati Jha, Senior Medical Physicist Pramod Kumar Yadhav and Ganesh Subedi for their supports. I also say my sincere gratitude to all other staffs especially radiotherapy

technologists for their operating support. Katmandu is a wonderful capital City of Nepal embedded by a hill. I have traveled some beautiful tourist spots like Bhaktapur Durbar Square, Nagarkot, Chandragiri Hill and many temples. I was also invited to visit Nepal Cancer Hospital and Research Centre and Kathmandu Cancer Center. Their hearty hospitality delighted me more. In this visit, good communications are build up with the medical physics community in Kathmandu. I hope we can work together in the future through SCMPCR"

Md. Anwarul Islam,
Coordinator Medical Physicist,
Square Hospital Ltd, Dhaka, Bangladesh.



Md Anwarul Islam for a courtesy visit to Kathmandu Cancer Care, Bhaktapur, Nepal.

Prof. Dr. Hasin Anupama Azhari, CEO of SCMPCR arranged Mr. Md. Anwarul Islam for the commissioning work through a memorandum of understanding (MoU) made between SCMPCR and Square Hospitals Ltd, for three weeks from 15 July to 4 August 2019. The commissioning works started on 16 July and within two weeks all the measurements for two photons and five Electron energies were completed. The first patient was treated on 29 July 2019. This day the Hospital authority celebrates by sacrificing he-goat based on Hindu belief. Most of the Kathmandu based newspapers covered this news. The Portal Dosimetry (PD) for IMRT Patient-Specific QA was also commissioned and successfully evaluated against TPS calculation and measured dose.



First patient treatment (left) and courtesy visit to Nepal Cancer Hospital and Research Centre (right)



ADVENT OF THE FIRST MEDICAL PHYSICIST FROM BHUTAN IN SCMPCR

By Tawshiq Hassan Patwary

South Asia Centre For Medical Physics and Cancer Research, Thana Stand, Savar, Dhaka.

Population of Bhutan is 763,092 in 2019. (Estimated) and Area is 38,394 km²



The total number of cancer cases in Bhutan has been steadily increasing over the years and in 2014 there were 639 cases reported across the country. Males had a higher incidence (61%) as compared to females (39%).

Bhutan Cancer Report, 2015.

Scenario of Cancer Status in Bhutan

World Health Organization (WHO) ranks Bhutan as the country experiencing the second-highest death rate per every 100,000 people suffering from oral cancer. Overall, other types of cancers are also a major issue in Bhutan. In every 100,000 people, skin cancer and stomach cancer deaths are ranked third and seventh respectively, the same report says. The number of cancer detection in the country has tripled in the past five years according to Dr. Ugyen Tshomo who is a Gynaecologist and one of the founders of Bhutan Cancer Society (BCS). Most cancers are curable if diagnosed early, but in Bhutan, the diagnosis usually takes place late and the outcome of treatment is also very poor. The annual health bulletin 2015, released this weakness, says that there were 938 cases of cancer in 2014 alone including 223 neoplasms (benign cancers) and 49 cervical cancers and 656 other types of cancers.

Assistant through regional cooperation

To manage this huge growing demand of patients, SCMPCR is trying to create skilled manpower for the cancer treatment team by international experts. Meanwhile, several training programs were organized in different hospitals to enhance the knowledge of the latest technology used in cancer treatment. SCMPCR is a humanitarian non-profitable organization that is striving to create adequate infrastructure and specialists in cancer treatment for the countries of South Asia since 2018.

SCMPCR specializes in providing quality services in cancer treatment through continues education in the discipline of radiotherapy and diagnostic radiology, job training and exchange program and collaborative research work. Major activities of SCMPCR are to produce skilled manpower, enhance health education and establish a welfare home for cancer patients.



Mr. Ramu Magndran, Chief Medical Physicist from the Jigme Dorji Wangchuck National Referral Hospital (JDWRH) has recently attended the SCMPCR hands-on workshop on reference and determination of relative dose, which is a part of dosimetry in small field in the external beam radiotherapy. He was the first Medical Physicist and is currently working in Bhutan. Another Physicist from Bhutan named Mr. Parsu Ram Sharma who is a lecturer at Jampel Secondary High School attended the Hands-On workshop on dosimetry and treatment planning organized by SCMPCR. Bhutan needs further assistant to strengthen their cancer treatment facility through the regional cooperation in South Asian region. SCMPCR is willing to provide more assistance to the local medical physicists in Bhutan for their education and training through scientific programs in future.

Breast Cancer Awareness Program Benefits More than 350 College Students in Gazipur

Globally, breast cancer is the most common cause of cancer-related death in women, with around 32700 deaths in each year. There are 1.35 million new cases every year, and about 4.4 million women are believed to be living with breast cancer at present. An estimated 1.7 million women will be diagnosed with breast cancer within 2020—with a 26% increase rate from current levels—mostly in the developing world. Breast cancer is already the leading cause of cancer in southeast Asian women.

In India, almost 100 000 women are diagnosed with breast cancer every year, and a rise of 131 000 cases is predicted by 2020. In Bangladesh, some 12,764 women are detected with breast cancer every year and 6,844 of them die because of the disease according to a report of the International Agency for Research on Cancer (IARC). To meet this significant and growing health challenge, a trust has been established under the name of AloBhubon Trust (Alo-BT). South Asia Centre for Medical Physics and Cancer Research (SCMPCR) is a sister concern of Alo-BT, and its motto is to provide quality education and health science for patient benefit.

"Prevention is better than cure" from this popular belief to remove the threat of breast cancer, SCMPCR organizes breast cancer awareness program very year. As a continuation of that SCMPCR has organized a seminar titled "Breast Cancer Awareness Program" in Gazipur Metropolitan College, Gazipur on 10th October, 2019. The seminar was presided over by Prof. Dr. Ruhul Furkan Siddique, Professor, Department of Public Health and Informatics, Jahangirnagar University. Md. Nazem Uddin, the Principal of Gazipur Metropolitan College, remained present as the chief guest whereas Prof. Dr. Golam Abu Zakaria, Founder Chairman, SCMPCR was present as the special guest of the program. Dr. Islam Uddin Chowdhury, Consultant, Medical Oncology, Ahsania Mission Cancer and General Hospital, was present as the keynote speaker and Prof. Dr. Hasin Anupama Azhari, General Secretary, AloBhubon Trust, was present

as the chairperson. Besides, Ms. FatemaTuz Zohra, Executive Magistrate, Gazipur, and Mr. Shah Shamsul Haque Ripon, Gazipur Press Club, were also present as guests in the seminar.

Prof. Dr. Ruhul Furkan Siddique said "Early detection of breast cancer can save the lives of many women and this type of seminar is one of the best ways to increase awareness". Prof. Dr. Golam Abu Zakaria stated that "A girl is a sister, mother or wife". He urged to create an awareness of the fatal disease among the female students of the country so that they can spread this knowledge which will benefit their family, society, and country. He also spoke about the contamination of nature through plastic and air pollution. Dr. Islam Uddin Chowdhury in his keynote speak expressed that "breast cancer treatment and cure is only possible when it is detected at the initial stage, he also

focused on the adverse effect of mobile network tower in our country. Prof. Dr. Hasin Anupama Azhari said that "talking about breast is a taboo in Bangladesh". Some girls believe that this topic is ignominious and never want to discuss even with their husband, and family members.

As a result, women are diagnosed with late-stage breast cancer. Then it becomes like a burden of that family for expensive treatment as well as in terms of the existence of life. She believes, with such type of seminar the number of deaths in women caused by breast cancer can come into zero in no time within the country. More than 350 female students of HSC level and more than 50 teachers attended in this awareness program. They diligently approached the seminar and the students said they had benefited immensely which will be a tremendous effect on their life and family.



Guests of the cancer awareness program



Participants of the cancer awareness program

Development and Cooperation of Medical Physics in South Asia Region



The University Heidelberg is coordinating of DAAD Medical physics activities which were rooted in 2000 and reloaded for the period 2014 - 2017. First 4 years funding was concentrated into the improvement of medical physicist's education in Bangladesh. This was focused on Bangladesh to improve the exchange of teachers and students, PhDs. Now, for the application period 2018 to 2021, the DAAD committee requested to spread out the activities to the South Asia region. In the past, a lot of money was spent on bringing people to Germany. Traveling costs, accommodation is expensive and Mannheim is also universities city and getting live in August to September is very difficult. The idea was to spend more money in the South Asian region in terms of bringing to the people and in that case, the SCMPCR was established. The SCMPCR is organizing workshops in South Asian region and, has done a lot of activities in last two years.

In this regards, a workshop on Development and Cooperation of Medical Physics in the South Asian Region took place from 17-22 of September 2019 at the University of Mannheim, Germany under the cooperation between Gono University and Heidelberg University with the aspect of South Asian regional cooperation. All the experts and participants from the South Asian region were funded by a scholarship of the German Academic Exchange Service (DAAD). The intent of the workshop was to discuss to bring more activities to South Asia and down the activities in Germany and to have a face to face meeting with people from South Asia to know each other.

The experts invited from South-Asia Prof. Dr.A.Chougule (India), Dr.Hoque (Bangladesh), Prof.Dr.Hussain (Bangladesh), Dr.J.Jeyasugiththan (Sri Lanka), Dr. S. M. Naqvi (Pakistan) arrived at Mannheim City on 17th of September 2019. Attendees from Germany are Prof.Dr. G.A. Zakaria, Dr.F.Hensley. and Mr. Volker Steil. The workshop was facilitated by Mr. Volker Steil and Prof.Dr. G.A. Zakaria.

On the day 1, 18th of September, Mr. Volker Steil welcomed the experts and introduced the department of Radiation Oncology of

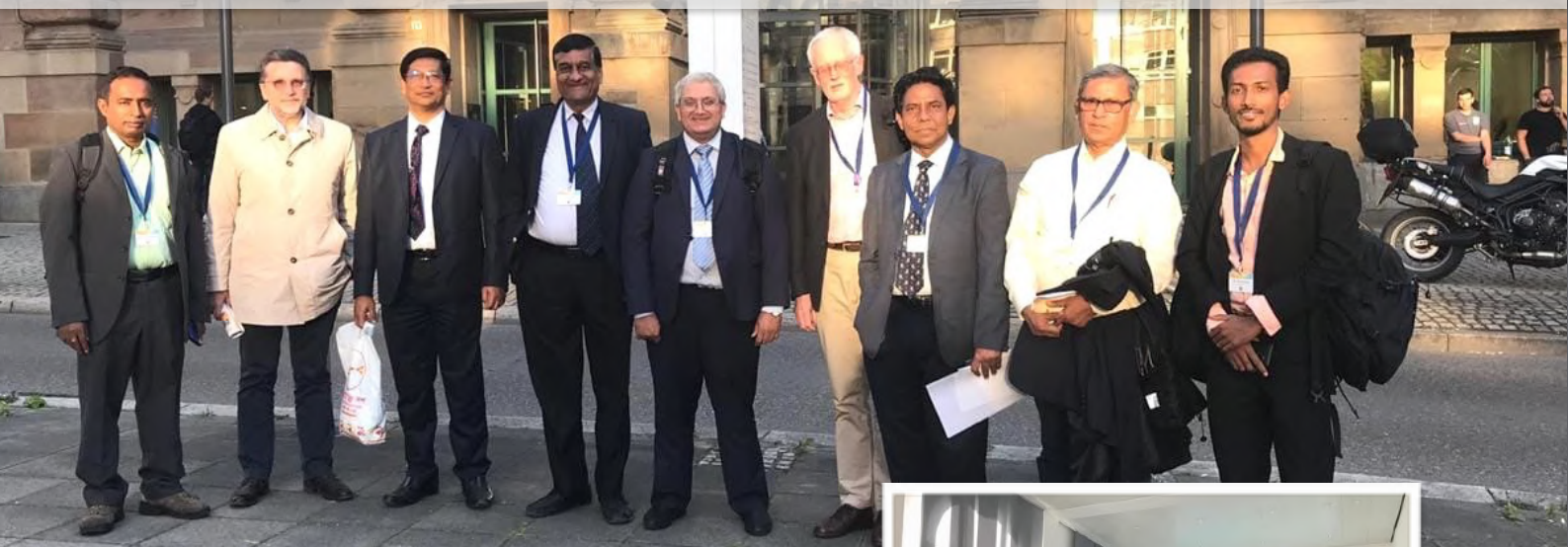
the University of Mannheim. The departments of the hospital and the facilities were introduced to the participants.

On the second day, 19th of September 2019, a seminar on the Working Group of Medical Physics in the Developing Countries was started with the introduction of participants and followed by a speech of Mr. Volker Steil. He briefly explained past and current activities through DAAD collaboration and the purpose of arranging the workshop. After onwards there was a broad discussion among the participants about medical physics education and training in the South Asian region. Dr.A.Chougule, Senior Professor and head of radiological physics at SMS medical college and hospital said that his department has a fulfilled department and they received candidates from IAEA for the training. So they can have a short time training but funding as far as the Government is very difficult to give it to the outside country. Further he said that they can assist the participants to find their local needs during the stay in India.

The expert from each countries presented about current status and future demands of Medical Physics. Following the country presentation by the experts and long discussion, experts agreed for a cooperation between the SARAC countries (south-south and also for north-south cooperation) by extending activities in the South Asia region. Prof. Zakaria expressed that without cooperation and physical involvement it would be very difficult to achieve our targets that has been embedded. Further he said that we are very grateful to the German government for providing assistance to improve the health sector and educational sector in the South Asia. Germany is the best friend of Bangladesh since independence. The German government provides most of the assistance and at present there are 16 important projects.

The participants were taken to Stuttgart to participate the DGMP 2019 on 20th September 2019 and to the University Heidelberg on 21st September 2019. It is most Beautiful City in Germany. The participants were visited many places in the beautiful city of Heidelberg and spent whole day.

The Expert Group from South-Asia Participate the 50th Annual Meeting of the DGMP Session: Medical Physics in Developing Countries



50th Annual Meeting of the DGMP was held from 18-21 September 2019 in Stuttgart, Germany. The expert group from South-Asia Prof. Dr.A.Chougule (India), Dr.Hoque (Bangladesh), Prof.Dr.Hussain (Bangladesh), Dr.J.Jeyasugiththan (Sri Lanka), Dr. S. M. Naqvi (Pakistan) participated the workshop on "Development and Cooperation of Medical Physics in South Asia Region" in Mannheim from 17th -22nd of September 2019 visited Stuttgart to participate the DGMP 2019 (Session 22): Medical physics in developing countries on 20th September 2019.

The session was jointly chaired by Prof.Dr. G.A. Zakaria and Mr. Volker Steil. There were six invited talks scheduled from 15:45 to 16:45. The first talk was delivered by Prof. Dr.A.Chougule, speaking on behalf of AFOMP about AFOMP initiatives and efforts in harmonizing and improving medical physics education in South Asia. He expressed his view about overview of AFOMP, the reason for AFOMP created and its functions. The next speech was about South-South cooperation for financing SDG'S: Bangladesh experience delivered by Dr.K. A. Hoque. Followed Dr. H. Qazi Mushtaq delivered a talk about collaboration between regional oncologists and medical physicists who can play a vital role in improving the quality of radiotherapy services in the South Asia region. He noted that the evidenced-based radiotherapy must be adapted to regional and national needs and radiotherapy personnel, especially radiation oncologists and medical physicists, in the South Asian Member States will adapt the new development in radiotherapy applications and will improve their daily practice.



Dr.S. M. Naqvi talked about status of the Medical Physics profession in Pakistan and need of regional professional cooperation. His talk was brief about the available radiation facilities for patients, regulations infrastructure, the current situation of Medical Physicists' professional status in Pakistan including the education & training, accreditation opportunities and the formation of a professional body. As South Asian region accounts for about a quarter of the world's population, a minor improvements in the field of Medical Physics can lead a larger impact on cancer treatment and radiation based facilities & pertinent human resource are still the greater challenges, he further mentioned.

Dr.J.Jeyasugiththan delivered a talk about Medical Physics in Sri Lanka: current status and perspective through regional cooperation in South Asia. In his talk, he emphasized that the prospects for structured national clinical training and education can be upgraded through regional cooperation activities in the South Asia region. Moreover, regional cooperation in SAARC region is proposed to focussing on connecting medical physicists in the region to share human and technological resources for the skills upgrade and promotion of good practice for all medical physics professionals. Local Medical Physicists can also visit other institutions in the region to complete their training with minimal expenses. The session was ended with a talk about South Asia Center for Medical Physics and Cancer Research (SCMPCR): A regional competence center for cancer control in South Asia delivered by the Chairman of SCMPCR Prof. G. A. Zakaria. He underlined that the SCMPCR is committed to improving cancer treatment in Bangladesh and other countries in South Asia. It wants to go through the dissemination of scientific information and the promotion of training and professional development to increase the quality of medical care for patients.

South Asia Centre for Medical Physics and Cancer Research (SCMPCR) also works at the district level in rural Bangladesh to ensure proper quality assurance (QA) of the diagnostic equipment. The rationale is to consider these rural health centres as the primary healthcare units where the first diagnosis should be made and responsibility for providing integrated continuing care should lie. In Bangladesh, such centres could serve several thousands of rural people living in remote villages and often consider as the only medical help facility available to them. This type of centre has only basic some staff, sometimes without a medical doctor and with limited basic medical equipment availability. Maintaining this equipment is a major problem and training staff for the purpose is not a lesser challenge. From this point of view, the operation of the equipment in the rural health centres will depend on the performance of the staff. As a result, the safe and effective use of this equipment is of great importance and special care is necessary for training the rural health centre staff for this.

Regarding these issues, the joint venture of SCMPCR and a German organization Senior Experten Service (SES) was brought a senior expert Mr. Ioan Pauliuc for seminar cum onsite trainings titled "Servicing and Quality Control of Diagnostic Machines in Hospitals" from 22nd June, 2019 to 11th July, 2019 in



Fig. 1: Shahid Tajuddin Ahmed Medical College Hospital

different hospitals, institutes and universities. Onsite training provides more benefit than foreign training where daily problems can be discussed with the experts immediately and knowledge can be shared according to the country-based problems. The aim is to share knowledge and experience in order to improve other people's future prospects.

Mr. Ioan Pauliuc, Bonn Germany is an expert on Medical technology (X-ray equipment, CT, anesthesia and respiratory equipment, Electricity Electromechanics, Hydraulics and Mechanics).

Tajuddin Ahmed Medical College Hospital in Gazipur

The first visits of Mr. Ioan Pauliuc were in Shahid Tajuddin Ahmed Medical College Hospital located in Gazipur. A five-day training workshop (Fig: 1) was organized in Shahid Tajuddin Ahmed Medical College Hospital from 23rd to 27th June, 2019. In the training, Mr. Pauliuc visited Radiology and Imaging unit, Dialysis Unit and Anesthesia department and trained the doctors, nurses and technologists about improving the quality of treatment and to accomplish specific maintenance of medical equipment. Some of the

A German Biomedical Engineer visit different hospitals in Bangladesh





Fig. 2: Sheikh Fazilatunnesa Mujib Memorial KPJ Specialized Hospital and Nursing College Specialized Hospital

repairable equipment (Suction machine, Patients monitoring device, Urological stone destroyer machine) of the hospital were repaired by him and he also taught the concern personnel how to repair those equipments.

Sheikh Fazilatunnesa Mujib Memorial KPJ Specialized Hospital and Nursing College

The second visit of Mr. Ioan Pauliuc was in Sheikh Fazilatunnesa Mujib Memorial KPJ Specialized Hospital and Nursing College. A three days training workshop was organized in Sheikh Fazilatunnesa Mujib Memorial KPJ Specialized Hospital and Nursing College from 28th June to 1st July, 2019. On 29th June the program was started at 10:00 am by the meeting with Nuradilah Binti Shuib (Chief Finance Officer) & Dr. Md. Razeeb Hassan (Medical

Director) of the Hospital. During the meeting, there was a discussion about the work plan of 3 days and other general medical issues. After the meeting, Mr. Ioan Pauliuc checked the list of damaged equipment from the biomedical engineers of the hospitals Mr. Suman Kumar Das & Mr. Jahangir Alam. Then there was a discussion about biomedical instrumentation, future progress and development. After that he repaired and explained the basic concepts and working principles of some medical equipment and taught them how to repair.

Lalmonirhat District

After successfully completing the training of two hospitals of Dhaka Division, he visited a few small clinics of Lalmonirhat district from 2nd to 8th July, 2019 (Fig:3) with the association of Dr. Faiza Ela Kamal,

president of Rotary Club of Dhaka, Rose Vale. During this period a seminar was organized on 4th July at Upazila Sadar Hospital, Patgram, Lalmonirhat. In that seminar, the discussant importantly focused on proper use of X-rays and Cancer prevention Strategies.

SCMPCR office and Gono University

After returning to Dhaka, Mr. Pailiuc was taken to visit the department of medical physics and biomedical engineering, Gono Bishwabidyalay and also taken to visit some beautiful places near Savar. On 9th July he visited SCMPCR office and received a memorandum from the CEO of SCMPCR Prof. Dr. Hasin Anupama Azhari and addressed his opinion regarding the outcome of the workshop.

Al-Amin Digital Diagnostic Centre Savar, Dhaka

On 10th July, 2019 he visited two small clinics in the Savar area. An ultrasound machine was damaged for a while at Al-Amin Digital Diagnostic Centre. By knowing that he visited there and fixed it immediately like a magician. The owner was very happy and thankful to SCMPCR and Mr. Pailiuc.

This training was an opportunity for the staff of the hospitals to enrich their knowledge about biomedical instrumentation and general medical issues. One of the main objectives of SCMPCR is to improve the quality of diagnostic radiology in the districts and rural hospitals. This training was a great initiative to reach that goal. After all, it was really a wonderful Hands-on workshop program which has created a

Continued on page 11



Fig. 3: Seminar at Upazilla Sadar Hospital, Lalmonirhat district



Digitalization in Radiation Oncology

Md. Jobairul Islam¹, Md. Foysal Rabbi²

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The Global Health Catalyst (GHC) is playing an essential role in improving quality health care through arranging summit for Europe and Africa with a goal to catalyze high impact international collaborations and initiatives to eliminate global health disparities, with the main focus on cancer and other non-communicable diseases. The Global Health Catalyst (GHC) has been funded by the Radcliffe Institute for Advanced Studies at Harvard University, the Brigham and Women's Hospital, and the Dana-Farber Cancer Institute, Harvard Medical School, and a growing number of funding agencies and industry partners.

This year the 16th annual joint workshop on Digitalization in Radiation Oncology between the University Medical Center Mannheim (UMM) and Harvard Global Health Catalyst (GHC) was held on September 6, 2019 in Mannheim, Germany. Modern radiotherapy resembles a safe and efficient pillar of cancer treatment. With increasing automatization and digitalization, operation of high-tech equipment becomes feasible for even less experienced centers. The joint UMM-Harvard Global Health Catalyst Workshop will strongly focus on emerging strategies to automatize common clinical workflows in radiotherapy. It will also provide a forum for physicians and physicists from emerging countries who are eager to improve health care in their countries by establishing these technologies.

In this workshop more than 100 participants from different countries participated and exchanged their knowledge, experience, and buildup a network. Organizing Committee invited four participants from Bangladesh. Prof. Dr. Golam Abu Zakaria (Chairman of SCMPCR), Mr. Jobairul Islam (Program officer of SCMPCR), Mr. Foysal Rabbi (Faculty of MIST) and Mr. M Juel Khondakar attended in the workshop. As per the discussion on the 2019 Harvard Global Health Catalyst Summit, the SCMPCR participants discussed about virtual education and e-learning solutions in global radiation oncology and about the progression of the collaboration of SCMPCR and GHC. The workshop was well organized, and the participants

gained immense knowledge from this workshop.

The workshop started with a welcome and introduction of keynotes which were delivered by Prof. Dr. Frederik Wenz (CEO, University Hospital Freiburg, Germany) and Wil Ngwa (Director, Harvard Global Health Catalyst Program, Harvard Medical School). In the keynote speech session, Dr. Wenz discussed "Digitalization of a University Medical Center" and the significant impact of using Artificial Intelligence (AI) and Deep Learning in medical imaging whereas Dr. Wil Ngwa delivered his speech on the establishment of a cloud-based cancer center.



SCMPCR Participants with Director, Harvard Global Health Catalyst



Prof. Dr. Golam Abu Zakaria rewarded Global Radiation Oncology Distinguished Leader Award 2019

Session 1 was on Digitalization of Patient Management. This session addressed the current situation of German e-health and the prospective development of the e-health care in radiotherapy, including the miracum initiative, digital follow up in radiation oncology, TeleGrapH Trial etc. Session 2 consisted of digital and adaptive radiotherapy, which focused on the modification in any of the initially planned parameters during the treatment course to re-optimize the treatment as a reaction to occurring unavoidable changes. This session represented the

digital approach of MR-to-CT for treatment planning, auto contouring, planning, optimization of adaptive radiotherapy, auto Brachytherapy planning and rapid prototyping using the 3D printing technology.

Session 3 focused on the global radiation oncology where different speakers presented the current situations and projects of their countries, including the radiotherapy center in Nigeria, Cameroon comprehensive cancer center project etc. This session also addressed potential

collaboration opportunities in the field of Medical Physics and Radiation Oncology. Prof. Dr. Golam Abu Zakaria (Chairman and Chief Medical Physicist, Klinikum Oberberg, Germany) and Volker Steil (Head Physicist, Dept. Of Radiation Oncology, UMM) discussed about the German-USA-Africa-Asia collaborations current status and the future plan about this collaboration. This session ended with a collaboration panel discussion and Prof. Dr. Golam Abu Zakaria has been rewarded with Global radiation oncology distinguished leader award 2019 for his contribution to medical physics education in the world by Harvard Global Health Catalyst.

The workshop ended with the Master of Science (BME) graduation ceremony and Laudation speech with a group photo. The workshop provided a great platform in order to discuss the emerging technology to encouraged and broaden its efforts in technological development in the dominant field of informatics such that these innovations can be placed in the broader context of personalized cancer medicine and evidence building.

A lot of experiences regarding the arts of presentation and ideas of radiation oncology procedures were learned from this workshop. Most of them were new things that enriched the ideas and will help us to take wise-steps for the South Asia Centre for Medical Physics and Cancer Research (SCMPCR) in the future.

Continued from page 9

huge long-lasting positive impact to improve the health care facilities of the hospitals under this workshop and all the hospital's authority and staff expressed their gratitude to the SCMPCR authority for arranging this type of training programs. SCMPCR authority is very grateful to Mr. Ioan Pauliuc for being a remarkable trainer throughout the training period. Without his helpfulness and directness, the workshop would not have been successful. We hope this training will make a positive impact on improving the quality of healthcare and thereby mass people will be benefitted from it.



Fig. 4: Mr Ioan Pouliuc visited at SCMPCR office

FLASH Radiotherapy - Ultra-fast delivery treatment

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Over the last few years flattening filter free (FFF) beam is growing fast in the area of clinical treatments. The increased popularity because of a very high dose rate achieved (compare to dose rate of flattened filter beams) plays a crucial role. This can be seen among stereotactic radiotherapy deliveries of a very high dose per fraction (as 12-30 Gy) in very short delivery time.

Normally VARIAN Truebeam allows 6 MV and 10 MV Photons are 1400 MU/min and 2400 MU/min respectively [1]. But in FLASH radiotherapy involves the Ultra-fast delivery of radiation treatment at dose rates several orders compare to standard clinical practice. FLASH radiotherapy defined Ultra-high dose external beam therapy delivered in less than 1 second, in one to three treatment sessions. The issue of the journal of clinical oncology contains a review of the biological benefits of Ultra-high dose rate FLASH radiotherapy.

As compared to normal dose rate (0.03Gy/s) the ultra-fast delivery of radiotherapy (40 Gy/s) spares more normal tissues which have been supported by experimental data from various in vitro cell and tissue culture models [2]. The recent animal experimental studies showed that the whole brain mouse FLASH irradiation at 10 Gy as saved the spatial memory, but in the same dose of conventional dose rate could not save [2]. Another study conducted on neural stem cells and results showed that neurogenesis was spared at doses up to 20 Gy in FLASH, but 10 Gy was sufficient at conventional dose rate to diminish the neurogenesis.

One of the most hanging animal research listed is the treatment results of cats suffering from a spontaneous squamous cancer of the nasal plenum after FLASH irradiation. While under anesthetic these animals had been handled with a single fraction of 25-41 Gy to treatment volumes of 6-25 ml. Despite the excessive single doses used, dose-limiting toxicity was no longer seen, with solely minimal or slight mucosal or skin acute outcomes that did not impair the animals' capacity to eat. The tumour control chance was once high in contrast with historical results, with a charge of 84% at 1 year, besides any observed late effects [3].

The first treatment of a primary patient with FLASH-radiotherapy shown that in a 75-year-old patient given with a multi resistant CD30+ T-cell body covering cancer disseminated throughout the total skin surface. This treatment was given to a 3-5-cm diameter skin tumor with a 5.6-MeV accelerator specifically designed for FLASH-RT. The prescribed dose to the PTV was 15 Gy,

in 90 ms. Redundant dosimetric measurements were performed with GafChromic films and alanine, to envision the consistency between the prescribed and also the delivered doses. After 3 weeks the height of the reactions, a grade 1 epithelitis (CTCAE v5.0) alongside a transient grade 1 swelling (CTCAE v5.0) in soft tissues encompassing the growth was observed [4].

Currently, few devices are on the market to deliver ultra-high dose radiation, however diagnosis devices specifically designed to treat humans are being put in within the USA and Europe. Hard on the heels of once new techniques that have currently become commonplace, like intensity-modulated radiotherapy, image-guided therapy and stereotactic ablative therapy, FLASH therapy clinical trials using photons and protons may begin within the next few years. The main improvement because of FLASH-RT was the nice tolerance profile giving an extra opportunity for dose step-up to neoplasm for their management.

Key points about FLASH Radiotherapy:

1. Ultra-high dose rates in FLASH 720,000 cGy/min (only in Pro-beam Research mode)
2. FLASH spares normal tissue compared to standard Radiotherapy (RT)
3. FLASH spares the skin from toxicity
 - No erythema, no moist desquamation,
 - No fiber necrosis, no hyperkeratosis,
 - No inflammatory infiltrates, no dermal remodeling

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Radiation techniques for breast cancer treatment in the new era

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Breast cancer is the most frequent cancer in women and the second common type of cancer worldwide after lung cancer [1,2]. Breast cancer alone accounts for 29% of all new cancers among women in 2014 [4] and it is the second cause of cancer death in women both in Europe [2] and in the USA [2,3]. The therapeutic use of radiation has evolved dramatically over the past century. The journey is eventful which started with brachytherapy and still continuing in parallel to the most modern external beam radiation techniques. Slowly but steadily the use of fascinating sophisticated external beam radiation techniques is getting a foothold. Several therapeutic methods for breast cancer treatment are used, namely, surgery, systemic therapy and radiation therapy (RT). RT is used supplementarily to surgery and/or systematic therapy or as a single treatment method. Radiation therapy for breast cancer uses high-energy X-rays, protons or other particles to kill cancer cells. Rapidly growing cells, such as cancer cells, are more susceptible to the effects of radiation therapy than are normal cells. Radiation therapy for breast cancer may be delivered in two ways:

Brachytherapy:

Brachytherapy referred to as internal radiation therapy, is a form of cancer treatment in which a sealed radioactive source is placed in or near a tumour to kill it. Brachytherapy is used to treat early stage localized cancers that have not spread (metastasized) to other parts of the body. It has been in use for most of the 20th century. In the 1920s, Keynes used interstitial radium needles to implant the entire breast to treat breast cancer [4]. With the advent of megavoltage radiation, external-beam radiation therapy (EBRT) was used to treat the whole breast, with brachytherapy being utilized as a boost for unresected tumors. The high total doses resulted in poor cosmetic results, and therefore, the trend was to perform lumpectomy followed by EBRT and lower doses of brachytherapy [5,6].

External Radiation

A machine delivers radiation from outside your body to the breast. This is the most common type of radiation therapy used for breast cancer. Besides technological hardware and software advances in delivery and planning systems, the fractionation schemes have changed a lot the last decades with recent hypo-fractionated radiotherapy schemes or emerging partial-breast irradiation protocols. The technical evolution allowed us a successive reduction in the treatment-related complications such as fibrosis and long-term cardiac toxicity. It has shown improving the locoregional control rates, rationale of as low as possible is appealing to focus more on heart and coronary sparing with four-dimensional (4D) breath-hold techniques. Modern radiotherapy techniques and fundamentals need to be implemented in routine clinical care with maximum safety and efficacy in order to maximize the benefit of locoregional treatment and to minimize the risks of late complications.

NEW TECHNIQUES IN EXTERNAL RADIATION

The radiotherapy techniques in the treatment of breast cancer vary in different institutions, but, in general, the issue of radiation dose delivery to the chest wall after total mastectomy or to the breast

following breast conservation surgery remains complex. Radiotherapy treatment fields are usually tangential to encompass the breast or thoracic wall, and, in some cases, matched to a supraclavicular field.

I. Three-dimensional conformal radiotherapy (3D-CRT):

After integration of CT and more sophisticated planning programs in radiotherapy clinical routine, target location can be defined precisely, and dose distribution can be obtained more homogeneously. The target and critical structure volumes for three-dimensional conformal radiotherapy (3DCRT) have been defined according to ICRU reports 50 and 62 [7]. A major challenge to improve dose uniformity is the irregular shape and size of the breast while minimizing the risk of treatment-related complications.

Over the years conformal radiotherapy has given an edge over conventional radiotherapy to minimize cardiac dose. Various combination of gantry angles, number of fields including field in field (FiF), beam weightage, wedge pair combination, multi leaf collimator (MLC) positioning and different energy combination, are some of the effective ways to reduce heart dose with 3DCRT.

II. Monoisocentric techniques

A single isocenter is placed in the junction of tangential and supraclavicular fields. The upper half of the tangential fields and the lower half of the anterior field are half-blocked, using MLCs. This method eliminates the requirement that the supraclavicular field has to be half-beam blocked, so that the isocenter can be located inferior to the matching plane. The tangential breast fields

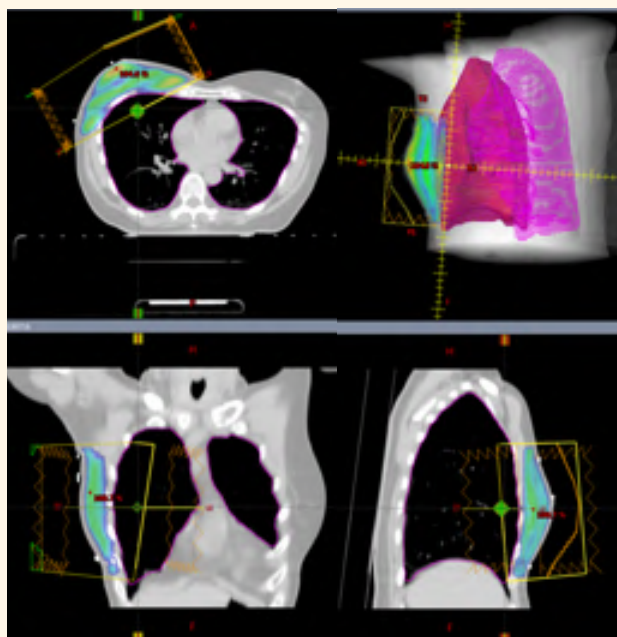


Figure 1: Dose distribution on transversal, coronal, sagittal plane and beams eye view (BEV) for a right-side breast cancer planning using FiF technique. The breast PTV is shown as a blue contour and the colourwash represents 95% of the prescription dose.

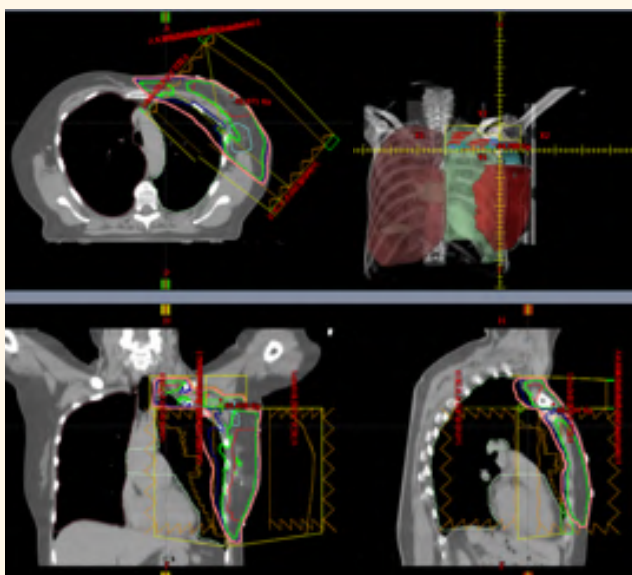


Figure 2: Dose distribution on transversal, coronal, sagittal plane and beams eye view (BEV) for left-side breast cancer planning in mono-isocentric technique for irradiation of tangential breast fields and supraclavicular field.

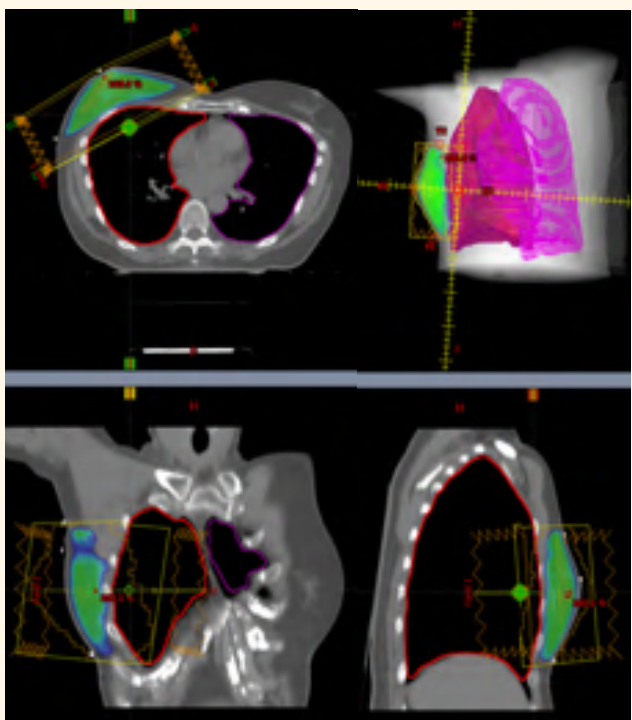


Figure 3: Dose distribution on transversal, coronal, sagittal plane and beams eye view (BEV) for a right-side breast cancer planning using dose dynamic IMRT. The breast PTV is shown as a blue contour and the colourwash represents 95% of the prescription dose.

are geometrically matched with the supraclavicular field by rotating the collimator and couch. With a single isocenter, the treatment delivery requires only one setup, thereby treatment time is significantly reduced. More importantly, without manual matching using a light field, the new method reduces dose variation in the matching region due to setup uncertainties.

III. Intensity modulated radiotherapy (IMRT)

With the advent of advanced sophisticated treatment planning software and multi-leaf collimators (MLC), intensity-modulated

radiotherapy (IMRT) is becoming increasingly popular and widely used for the treatment of breast carcinoma. The IMRT allows the user to modulate the intensity of each radiation beam, so each field may have one or many areas of high intensity radiation. The intensity of the beam can be varied with practically any available angle to direct the beam along with the facility to either treat with fixed field or dynamic MLC technique. Dosimetric studies have successfully documented superiority of tangent IMRT compared to 2D conventional planning or 3DCRT in providing excellent target coverage, better organ at risk (OAR) sparing. The merit of breast IMRT is well documented. However, the routine application of breast IMRT has to be wisely considered. For breast IMRT, intrafraction motion degrades treatment plans predominantly by the necessary addition of a larger CTV to PTV margin than would be required in the absence of such motion. This motion can be limited by breath-hold, respiratory gated, or 4D techniques [9].

IV. Volumetric modulated radiotherapy (VMAT)

Standard 3-dimensional 3D conformal radiation techniques often result in large dose inhomogeneity throughout the treatment volumes, inadequate target coverage, or excessive normal tissue doses especially when coverage to the internal mammary nodes is required. Breast planning with volumetric modulated arc therapy (VMAT) has been explored, especially for left-sided breast treatments, with the primary intent of lowering the heart dose and improving target dose homogeneity.

Clinical results demonstrating a detrimental effect of the low-dose bath, related to volume and dose levels, with respect to the two-tangential beam dose delivery, or the associated risk of secondary cancer induction, are currently not available. In the absence of such data, a good approach is to drive the VMAT optimization processes to decrease the dose to all the critical structures as much as possible, and to maximize the target dose homogeneity.

V. Stereotactic body radiotherapy (SBRT)

Stereotactic radiation therapy is most commonly used to treat brain cancer and cancers in other parts of the body, such as the lung, spine and liver, where it is called stereotactic body radiation therapy, or SBRT. It delivers a high-dose per fraction in a single or multiple fraction of radiation directly to the tumour, sparing nearby healthy tissue, in far fewer treatments than standard radiation therapy. The data of SBRT are not mature enough and not validated in a large prospective study with long term follow up in terms of long-term disease control and cosmesis.

VI. Breath hold-cardiac sparing methods

Breast cancer radiotherapy reduces the risk of cancer recurrence and death demonstrated by randomized trials, but as radiation delivery requires tangential and selectively mammaria interna fields, meta-analyses also have found an increase in cardiac deaths following breast cancer radiotherapy associated with the volume of the heart receiving 5 Gy or more [10].

Due to the interplay between respiratory motion and MLC motion during IMRT delivery, the planned and expected doses could be different. Respiratory motion is a well-known factor during treatment planning for breast IMRT, dosimetric studies presented that PTV dose heterogeneity increases as respiratory motion grows. The lung and heart doses also change with respiratory motion. As a result, a larger margin is proposed from CTV to PTV margin [8]. The breath-hold technique could help to minimize the effect of potential negative dosimetric impact arising from interplay effect of multileaf collimator and breathing motion

during delivery of IMRT. Breath-hold technique's dosimetric benefits have been clearly in the literature, but these techniques are not yet in widespread use.

VII. Prone Breast Irradiation

Most patients undergoing breast conservation therapy receive radiotherapy in the supine position. Historically, prone breast irradiation has been advocated for women with large pendulous breasts in order to decrease acute and late toxicities. With the advent of CT planning, the prone technique has become both feasible and reproducible.

Positioning women with early stage breast cancer in the prone (face down) position while undergoing radiation treatments can substantially limit the radiation dose that reaches the heart, lung, and skin. The heart can be particularly vulnerable to late effects of radiation when the left breast is treated in the supine (face up) position. A customizable positioning device allows the woman to lie comfortably in the prone position for radiation treatment, and the affected breast falls away from the chest wall.

Recent studies have demonstrated a significant reduction in dose to the heart and lungs when treated in the prone position and may possibly improve the short and long-term effects of radiation on the treated skin. Prone breast radiation may not be suitable for all women.

VIII. Proton beam therapy (PBT)

Proton radiation is a particle radiation which has a capability of depositing therapeutic radiation at a fixed point with sparing of tissues beyond the target. Clinical use of proton beam external radiotherapy in breast cancer has been on the rise since the last decade. The physical property of proton beam with its Bragg peak effect gives the advantage of excellent target coverage with OAR sparing to a great extent. PBT offers excellent potential to minimize the risk of cardiac events, keeping the mean heart dose at ≤ 1 Gy [11].

Although proton therapy is prescribed in fractions similar to photons, its radiobiological effect rate is higher than (1.1) photons. The use of protons in treatment has been evaluated primarily for tumors requiring high doses or located in close proximity to critical structures such as prostate cancer, brain

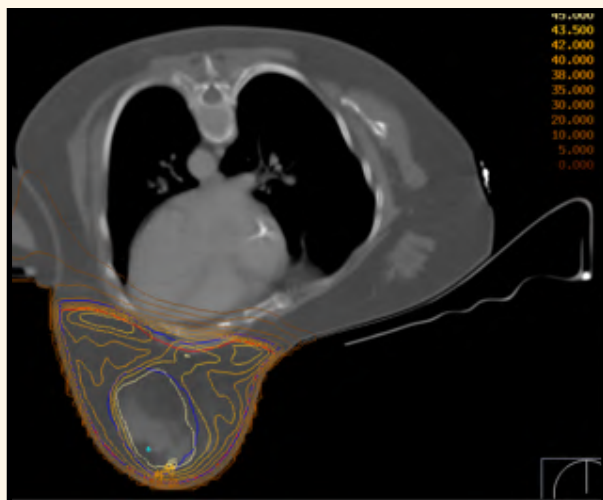


Figure 5: Dose distribution on transversal beams eye view (BEV) for a left breast cancer planning using VMAT in prone position. The breast PTV is shown as a blue contour and the isodose represents as a color bar.

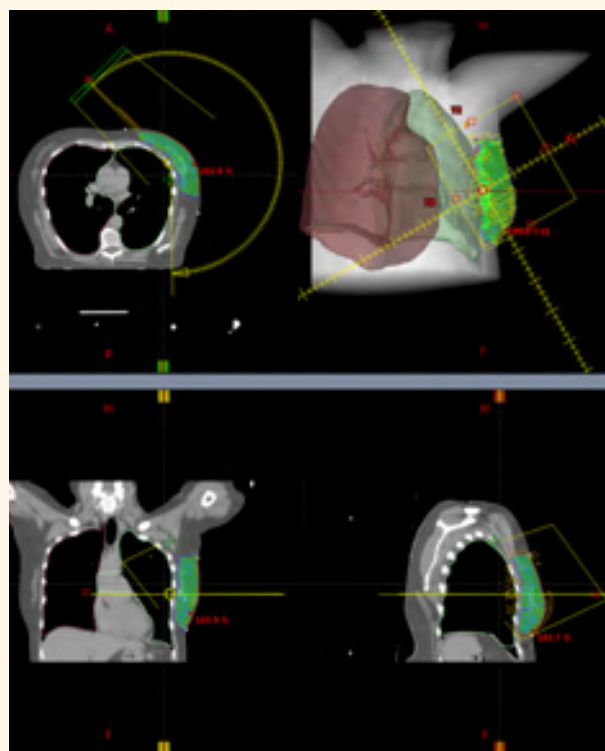


Figure 4: Dose distribution on transversal, coronal, sagittal plane and beams eye view (BEV) for a left breast cancer planning using VMAT. The breast PTV is shown as a red contour and the colourwash represents 95% of the prescription dose.

tumors and childhood cancer. Despite dosimetric advantages, extensive cost of equipment and maintenance has been defined as an important barrier fact for protons to become widespread in clinical use.

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Medical Physics in Rwanda

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Background of cancer status and Radiotherapy

The burden of cancer continues to have a global impact across low- and high-income countries and among both urban and rural populations. It was found that 65% of cancer deaths in Low- and Middle Income Countries (LMICs), the large part driven by rates within sub-Saharan Africa (SSA), where cancer mortality is expected to double by 2030. According to the report from Rwanda Biomedical Centre (RBC), in 2018 and 10,700 new cancer cases were diagnosed. Breast cancer is the most prevalent, followed by prostate, cervical, liver and colorectum.

Among SAA countries, Rwanda is included. Rwanda is a relatively small landlocked, hilly country in Central Africa, located south of the Equator and east of Lake Kivu, one of the African Great Lakes. Rwanda is one the sub-Saharan country, with population of Rwanda has a population of 11.5 million People distributed on country area of 26,338 km².

Until 2017, Rwanda has been one of the 28 African countries do not have a radiotherapy facility. However, comprehensive cancer care, including clinical and pathology services and diagnosis, chemotherapy, surgery has been being done by one of national cancer referral center at Butaro District Hospital, located in the rural Northern Province. The access to radiotherapy for Rwandans has been limited historically to those who are able to travel abroad, either to neighboring countries with radiotherapy capacity (eg, Kenya, and Tanzania), or further afield to India or Europe. The cost of such services has limited access to those with substantial wealth and to the few patients sponsored by the Rwandan National Referral Board each year.

In 2018, Rwanda Military Hospital launched the region's top a cancer centre. The radiotherapy centre is equipped with two Linear Accelerators from Elekta, and is designed to offer advanced treatment techniques with VMAT (Volumetric Modulated Arc

Therapy) to all patients. As radiotherapy need the technical expertise mainly radiation oncologists, therapists, physicists, currently available medical physicists in Rwanda are still few compared to how they are needed. In this regard, the Rwanda ministry of health (MOH) is trying to train medical physics, through various programs, including its meaningful corroboration with department of medical physics and biomedical engineering at Gono university, which is training us to become medical physicist in the future.

Currently, there is growth in the number of radiological and therapeutic facilities in Africa, with an increase in the training of other relevant personnel like radiologists, oncologists and radiographers, however, these centres still have very few qualified medical physicists.

To improve the role and recognition of medical physicists in Africa, FAMPO was established. FAMPO is the Federation of African Medical Physics Organisations. Its main role is to bridge the gap between individual medical physicists, existing medical physicist bodies and the International Organisations of Medical Physics (IOMP).



Welcome of two students from Rwanda in Bangladesh by faculty MPBME



Kamanzi and Rangira with their Classmates, MPBME, Gono University



Mr Moklesur Rahman received the students from Rwanda at the Bangladesh airport.

Challenges faced by medical physicists in Africa

A study was carried out to identify the challenges faced by medical physicists in Africa and the objectives of the study. The study was conducted on thirteen medical physicists from seven African countries like Nigeria, Kenya, Libya, Tanzania, Zambia, Uganda and Ghana.

- These cannot work independently.
- However, working experience shows that some of these have kept working for about seven years without access to clinical training.
- This is a challenge of using unqualified medical physicists to Mann patient's care and management.
- 54% of medical physicists working in hospitals in Africa do not have any additional clinical training.

There is shortage of qualified skilled medical physicists to manage all the activities the three areas of Radiotherapy, Radiology and Nuclear Medicine.

- There is lack of local training centres.
- The cost involved to obtain clinical training from the recognized training centres is high.
- Training of qualified medical physicists has been done by the International Atomic Energy Agency (IAEA).
- Little or no support is given to training medical physicists by individual governments.
- Access to such training information is very difficult.
- Lack of recognized bodies governing medical physicists
- Lack of coordination among medical physicists in a particular country and between countries in Africa.
- The law governing the use ionizing radiation is still weak in some African countries.
- Respect and financial support to the users from government officials is minimal.
- Ignorance about the role of a medical physicist from the hospital managers and health ministries.
- Lack of equipment has inhibited execution of their duties especially in areas of dosimetry, dose assessment and radiation monitoring.
- This has limited their participation in research and publication.
- Hospitals have no budget for continuous education to fund conferences or congress attendance. Most of these conferences are commonly supported by international organizations like IAEA, WHO.

Despite all challenges, Africa has radiotherapy departments but it is estimated that only 28% of current radiotherapy needs are being met in Africa, with the majority (60%) of the available radiotherapy capacity being located in Egypt and South Africa.^{3,4} the available number of trained medical physicists to work hand in hand with oncologists to deal with the current cancer problem is still low. On the load to development, there is a great hope that challenge will be solved in future.

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The Inauguration of Sri Lanka Medical Physicist Society (SLMPS)

By Ms. Mahesha Jayakody

The inauguration of Sri Lanka Medical Physicist Society (SLMPS) was held at the FGS Auditorium, College House, University of Colombo on 27th of July 2019 with the participation of the professionals and academics in the field of medical physics. It was long-awaited event. The Society is a non-profit, non-trade organization primarily engaged in educational and research activities throughout Sri Lanka in the field of medical physics. It represents the interests of its members and creates education and training possibilities for the same.

About 30 participants attended the event. The opening ceremony was chaired by the Senior Professor Chandrika N. Wijeyaratne, the Vice Chancellor of the University of Colombo. Dr. P.W.C. Panapitiya, Deputy Director of Health Services, Ministry of Health and Senior Professor R.K.D. Mahanama, the dean of Faculty of Science, University of Colombo served as the guests of honor. Along with the distinguished invitees, the traditional oil lamp was lit by the guests and participants. Mr. Athula Kumara, the Chief Medical Physicist of the National Cancer Hospital and President of the Government Medical Physicists Association (GMPA) delivered the welcome speech. Dr. Janaka Wansapura and Dr. J.Jeyasugiththan were nominated for the posts of General Secretary and President respectively.

Thereafter, the newly elected president took over the proceedings of the meeting and Mr. Athula Kumara was elected as president (elect) of the society. Ms. C. Vidanapathirana was elected as Treasurer of the society.

In his speech, the president gave a brief overview of SLMPS, mentioning the main objectives and the expected outputs of SLMPS. Further, he emphasized the importance of both academic and professional involvement in the field of medical physics for the betterment and enhancement of the health care sector. Moreover he proudly announced that SLMPS is planning to establish links with several international bodies and kindly requested the members to get the maximum benefits out of this platform. Dr. A.P.W.C. Panapitiya senior professor R.K.D. Mahanama and Senior Professor Chandrika N. Wijeyaratne, addressed the gathering in that order. In his speech Dr. Panapitiya emphasized that "knowledge sharing" is the key to expand the medical field and to facilitate the medical aspects in Sri Lanka. Further, on behalf of the ministry, he promised to provide the support needed to develop SLMPS and to achieve its prime goal. Dr. Mahanama highlighted the importance of establishing SLMPS and extended his heartiest wishes for the elected members and assured the support from the faculty of science. The interest shown by the SLMPS in developing international



President:

Dr.J.Jeyasugiththan
Senior Lecturer
University of Colombo



President Elect

Dr.Athula Kumara
Medical Physicist
NIC Maharagama



Vice President

Mr.Susantha Herath
Biomedical Engineer
Ministry of Health



General Secretary

Dr.Janaka Wansapura
Senior Lecturer
University of Colombo



Joint Secretary

Mr. Lakitha Ruvinda
Medical Physicist
NIC Maharagama



Joint Secretary

Mr. A. Ramalingam
Medical Physicist
TH Jaffna



Joint Secretary

Mr. Dilan Fenando
Medical Physicist
Asiri Surgical Hospital



Treasurer

Ms. C Vidanapathirana
Medical Physicist
NIC Maharagama

collaboration was highly appreciated by Senior Professor Chandrika N. Wijeyaratne. The inaugural meeting of SLMPS was adjourned with the vote of thanks delivered by the General secretary, Dr Wansapura. He expressed his gratitude to the chief guest, distinguish guests and all the members who attended to witness the opening ceremony of SLMPS. He specially mentioned the support given by Dr.M.Lamabadusuriya, head of Nuclear Science department of Faculty of Science.

A two-day workshop was successfully conducted by the Sri Lanka Medical Physics Society (SLMPS) in collaboration with the Government Medical Physicist Association (GMPA) and the Department of Nuclear Science of the University of Colombo (UoC) from 19 to 20 October 2019. The main objective of this workshop to provide the basic knowledge of QA/QC of

were recorded for e-learning purposes and online broadcasted.

The workshop was well attended for both days. 52 participants including academics, medical physicists, biomedical engineers and scientific officers from academic institutions, government and private hospitals, and atomic energy board & regulatory council attended the workshop. The workshop was facilitated by Prof. (Dr.) Arun Chougule, Senior Professor & Head,



SLMPS/GMPA/UoC Joint Workshop on Quality Assurance and Quality Control of Equipment in Diagnostic Radiology

By Ms. Mahesha Jayakody

diagnostic equipment and protection perspective of radiation to promote QA/AC activities in Sri Lanka. The workshop was fully sponsored by Technomedics Healthcare Solution in collaboration with the PTW dosimetry Pvt Ltd India. Media coverage to the event was given by the official media unit of University of Colombo, Faculty of Science (FOS). All the sessions

Department of Radiological Physics, SMS Medical College & Hospital, Jaipur, India and Mr. K Kanakavel and Mr. S. Vignesh from PTW Dosimetry India Pvt Ltd., Tamil Nadu, Chennai.

First day of the workshop was held on 19th October 2019 at Ariyana Reach Hotel, Maharagama. Followed lighting oil lamp



"The workshop has been an absolutely amazing and inspiring experience. First

when I was attending, I was not sure about some of the quality control and quality assurance methods that we use in diagnostic radiology. At the end of the second day I was filled with theory knowledge and practical knowledge. Therefore, I could start my research proposal with meaningful ideas. Prof. Chougule and other presenters delivered their speeches clearly. I like all the resources and found it easy to follow. Practical session went really well with the guidance of Prof. Chougule. I'm thankful for the SLMPS, GMPA and UoC for organizing this event"

Ms. Ishani Jayakody, post graduate student, MSc in Medical Physics, University of Colombo.

by the guests, the workshop was formally inaugurated by Dr. Manuja Lamabadusuriya, Head of Department of Nuclear Science, Mrs. C. M. Vidhanapathirana, Secretary of Government Medical Physicist Association (GMPA), Dr. Jeyasugiththan, President, Sri Lanka Medical Physics Society (SLMPS), workshop organizing chairman and Mrs. Sulari Colambage Workshop organizing secretary. Day 1 began with a presentation on the Journey of Radiology in last 124 years by Dr. Arun Chougule.





He presented on the Radiation hazards, safety, and importance of QA/QC in Diagnostic radiology and Conventional X-ray Technology, QA - QC procedure for X-ray machines and CT Technology and QA - QC for CT machines. Mr. K Kanakavel presented on the Mammography Technology and QA - QC procedure for

Mammography machines. Quality Control tests in X-ray Diagnostic Radiology using PTW tools were presented by Mr. S Vignesh

At the end of Day 1 certificate issuing ceremony was held to the first day participants.

Hands-on practical sessions were held on the last day of the workshop which was 20th of October 2019 at Apeksha Hospital, Maharagama. In the morning all the participants had the opportunity to meet Dr. Arun Chougule and other speakers of the workshop. Practical was conducted under two groups, Group A and Group B that helped to increase the active participation of learners and enhance participant's interest. First session was conducted by Dr. Arun Chougule & Mr. Kanakavel about basic QA/QC procedures of conventional x-ray equipment and the second session was conducted by Mr. Vignesh about basic QA/QC procedures of CT equipment. At the end of the practical sessions, an introduction of DRLs and its clinical and radiation safety implications was given by Dr. Arun Chougule. The participants received their participation certificates during the closing ceremony with a vote of thanking delivered by Mr. Susantha Herath, vice president of SLMPS.



"The program was really impressive and interesting. The guest speaker was very knowledgeable and we have learnt so many things from them. It would be of great if you can extend the timing of these kind of future programs and also please kindly add more topics on Mammography and Ultrasound to the future programs"

Ms. Hiruni Dasanayake
Biomedical Engineer



"Attending the SLMPS Workshop on QA and QC in diagnostic radiology was one of the best

opportunities I've ever had, because it covered important facts and techniques regarding QA and QC. The primary goal of a radiology quality assurance program is to ensure the reliable facility and accurate diagnosis of patients. Therefore it is important to have a sound knowledge regarding QA and QC. This 2 day workshop helped me to improve my subject knowledge which I have already practiced at my working place. Workshop was very well organized and presented not only theories but also very informative practical. I liked the fact that all the lecturers tried to get the participants involved by making it a discussion. Thank you very much for giving us this opportunity, keep it up and looking forward another informative workshops near future"

Ms. Thilini Wickramasinghe
Medical Physicist

Medical Physics Progression and Activities in Pakistan

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Abstract:

Pakistan falls in Low & Middle Income countries according to the World Bank Report and the radiation treatment has not been a different story in Past. However, for past one decade or so, radiotherapy in Pakistan has taken new steps towards advancement and technology. Known for its Co-60 teletherapy units and conventional LINACs, few medical centres of Pakistan has now acquired Stereotactic Radiosurgery like Gamma Knife & Cyber Knife, Intraoperative Radiotherapy, Cyclotrons based Nuclear Medicine (PET/CT) practices, IMRT, IGRT, etc. In addition to this few medical centres are committed to acquire other equipment like tomotherapy and proton therapy machines in near future. This positive development has opened new doors for medical physics community to progress further from the basic to advance modalities. This paper describes the challenges and opportunities being faced by the medical physics community to enter in this new era equipped with technical and professional competence.

Introduction:

Medical physics is an important discipline that applies laws of Physics in the field of medicine. More prominently, medical physics is applied in case of radiation therapy, nuclear medicine, radiology and radiation protection. These fields are also called sub-specialties in various publications of the International Atomic Energy Agency (IAEA).

Pakistan is a country of about 200 million population. The health infrastructure is still in the developing phase. Some information about Pakistan with reference to medical physics is given below and table 1 :

- Pakistan has about 90 medical centers equipped with radiotherapy or nuclear medicine and diagnostic radiology facilities with more than 2600 radiation workers;
- Out of these 90 medical centres, 18 centres belong to one large organization i.e. the Pakistan Atomic Energy Commission (PAEC) with catering about 80% of radiotherapy patients load of the country;
- The PAEC also operated one university which offers medical physics program at Masters level;
- There is one "Cyber-Knife", one "Gamma Knife", One IORT and several "conventional linear accelerators" based facilities respectively;
- More advanced modalities with tomotherapy, cyberknife, proton therapy are expected to be acquired by the hospitals in near future.

Education and Training:

1. The only Medical Physics degree (MS) program was started in the year 2001 in the country at the Pakistan Institute of Engineering and Applied Sciences (PIEAS). As mentioned earlier, PIEAS is owned and operated by a large organization PAEC. Every year 12-14 graduates pass out from PIEAS. The number of graduating medical physicists depends on the projected demand at the medical centre of PAEC.
2. PIEAS has developed the Medical Physics curriculum following the IAEA guidelines for the development of curriculum and it addresses all major areas of medical physics including radiotherapy, nuclear medicine, radiology and radiation protection. This is a two year graduate program

comprising of class sessions, lab experiments, thesis and clinical attachments at a medical center having facilities of radiotherapy and nuclear medicine.

3. There are few other organizations that offer short courses on various topics of medical physics. A number of training courses have been conducted in Pakistan under the umbrella of Pakistan Nuclear Regulatory Authority (PNRA), the Pakistan Atomic Energy Commission, the Pakistan Organization of Medical Physicists (POMP) and various hospitals like Aga Khan University Hospital and Shaukat Khanum Memorial Cancer Hospital. Nosheen et al. showed the positive impact of such trainings.
4. PNRA's entity The National Institute of Safety and Security (NISAS) also organize training in specialized areas including
 - Quality Assurance in Diagnostic Imaging & Nuclear Medicine
 - Quality Assurance in Radiotherapy
 - Radiation Protection
 - Radiation Emergency Preparedness
 - Radioactive Waste Management
5. A private hospital, namely the Aga Khan University Hospital (AKU), Karachi have radiotherapy, radiology and nuclear medicine including PET/CT and Cyclotron facilities. The AKU is a Joint Commission of International Accreditation (JCIA) accredited center and it provides 2 year structured training and education to newly recruited junior medical physicists. Many of these trained medical physicists join other medical centers in the country and contribute very effectively.
6. There is no specific journal of medical physics in the country. The research on medical physics or related topics published abroad or in local journals, including Pakistan Journal of Radiology, Pakistan Journal of Nuclear Medicine and the Nucleus.

Regulatory Framework of Medical Physics in Pakistan:

Medical physicists are recognized as specialist professionals in Pakistan. PNRA has set the qualification criteria for medical physicists in Pakistan as mentioned below:

"MS (18 years education) Medical Physics or BS/MSc (16 year education) in Physics with 06 months on the job training";

Table 1: Details from the IAEA Project RAS6077 survey

Population (2013)	Existing RT units	Required RT units	RT machines per million population	Existing number of MP	Req. Number of MP	No. of MP per population
182	63	185	0.35	80	123	0.44

This criterion is undergoing major revision and separate criteria for radiotherapy, nuclear and radiology with enhanced requirement of training is being proposed.

The PNRA Regulations on Radiation Protection (PAK/904) requires that for therapeutic uses of radiation (including teletherapy and brachytherapy), the calibration, dosimetry and quality assurance requirements of these regulations are conducted by or under the supervision of a qualified expert in radiotherapy physics. The current regulations indicate that an MSc Medical Physics is the required academic qualification for radiation protection officers in radiotherapy facilities. So, there is a regulatory requirement in Pakistan to have a trained and qualified medical physicist in a facility for operational and radiation protection purposes.

Professional Activities of Medical Physicists:

Another important approach is the establishment of a professional body for the medical physicists. Pakistan Organization of Medical Physicists, POMP, was founded in the year 2010 and currently has 50 members. The POMP's vision, mission and goals are below:

Vision:

The Pakistan Organization of Medical Physicist is a scientific based and professional discipline encompassing physics principles and applications in biology and medicine.

Mission:

The mission of the Pakistan Organization of Medical Physicist to advance medical physics in Pakistan by disseminating scientific

and technical information; fostering educational and professional development of medical physicists.

Goals:

- Foster communication and cooperation amongst medical physicists in Pakistan.
- Contribute to the advancement of medical physics in all its aspects, especially in Pakistan.
- Disseminate scientific and technical information in the discipline.
- Foster the education and professional development of medical physicists.
- Encourage research and development to advance the discipline.
- Promote the highest quality medical physics services for patients and workers.
- Organize and/or sponsor conferences, regional meetings and Education & Training workshops/courses, in collaboration with other appropriate organizations.
- Issue a newsletter leading to a scientific journal and POMP Voice.

Conclusion:

The medical physics profession in Pakistan is progressing with rapid speed mainly due to (i) acquisition of high-tech modalities by the hospitals and (ii) revision in regulatory framework. However, few challenges are still in place like absence of (i) certification mechanism of medical physicists, (ii) specific research journal and (iii) medical physics graduate and undergraduate education programs at various universities. It is expected that with current development, such challenges can be overcome and reduced in future.

SCMPCR Hands-on Workshop: (HW- 06)

South Asia Centre for Medical Physics and Cancer Research (SCMPCR)

Commissioning and Quality Control for the IMRT/VMAT Treatment Techniques

Date: 25-27 April 2020

Venue: University of Colombo & NIC Maharagama, Sri Lanka

Acknowledgment



Organized by



Co-Organizers



An Experience of IMPCB exam and workshop at Doha, Qatar

Suresh Poudel, DIMPCB

Medical Physicist, B P Koirala Memorial Cancer Hospital, Bharatpur, Chitwan, Nepal



International Medical Physics Certification Board (IMPCB) was formed on May 23rd 2010 by eleven Charter Member Organizations in medical physics. One of its objectives and purposes is to grant and issue certificates in the field of medical physics to applicants who have been found qualified by the boards. To achieve this objective, it has been conducting examinations in different parts of the world since December, 2017. Examinations were held in Italy, Bangladesh, Prague, Mexico Saudi Arabia, Jordan, Austria, Chile in the past. Similarly on October 22- 24, part -1,2 &3 examinations were held in Hamad Medical Corporation's Medical Education Center, Doha, Qatar. In this exam, 27 candidates took the part-I exam, 26 candidates took part-II (7 in radiation oncology and 12 in diagnostic radiology) exam and 11 candidates took part-III exam. This exam attracted candidates from as far as Mexico, Ecuador, Pakistan, Bangladesh and Nepal and many of them were from middle-east region.

On October 20-21, 2019, a workshop titled "Workshop on Topics and Trends in Medical Physics", targeted for the candidates who come for IMPCB examinations preceding the exam. The speakers were Dr. Adel Mustafa from Yale University School of Medicine, USA, Dr. Carmel Caruna, Head, Medical Physics Department, University of Malta, Dr. Colin Orton, Professor Emeritus, Wayne State University, USA, Dr. Tomas Kron, Director of Physical Sciences, Peter MacCallum Cancer Center & University of Melbourne, Australia, Dr. Golam Abu Zakaria, Professor, Biomedical Engineering Department, Anhalt University of Applied Sciences, Germany, Dr. Rabih Hammoud, Chief of Medical Physics, Radiation Oncology-NCCCR- Hamad Medical Corporation-Qatar. The workshop started formally after Dr. Huda Al Naemi delivered the welcome remarks. There were two sessions-one on each day-both of which were chaired by Mohammad Hassan Kharita.

Prof. Orton delivered lectures on topics- "Goals, strategies and current status of the IMPCB", which made the audience clear about different aspects and need of being IMPCB certified and "Radiobiological Treatment Planning", where he discussed on the importance, algorithms, and development of radiobiological treatment planning. Whereas, Dr Adel Mustafa spoke on "Digital detection systems: past, present and future (pros and cons)", which was mostly about the development of digital detection system from early days till today, and "Digital imaging processing", which

shed light on the step wise step process in digital image processing. Similarly Dr. Carmel Caruana talked on "MRI acquisition sequences/optimization and artefacts", which became helpful to refresh ideas on MRI imaging process, and " USI: Colour/Spectral Doppler and ultrasound artifacts", which highlight the use of USI in radiation oncology & and its theoretical background. Likewise Prof. Zakaria delivered his lectures on "IMRT/ VMAT Quality Assurance and Pre-treatment Verification", where he shared useful concepts on machine and patient quality assurance, and "Current Development of Medical Physics in Radiation Oncology and Imaging", where he discussed about the recent development in medical physics. In addition, Dr. Tomas Kron delivered lecture on "Image guidance and motion management in radiotherapy", which threw light on the different techniques and use of imaging devices in motion management in radiotherapy, and " Functional Imaging in Radiotherapy", in which he discussed on ideas of incorporating functional imaging in radiotherapy planning. Another important speaker Dr. Rabih Hammoud spoke on " Overview: anatomy and physiology", which became helpful for audience to refresh their knowledge on anatomy and physiology. Everyone received the lectures with great enthusiasm and the knowledge was also helpful for enhancing ideas and skills in different aspects of radiotherapy.

On 20th evening, HMC organized a gala dinner at the Mamig Restaurant located at Katara. It was a nice evening with delicious food and exotic environment. On 22nd, 23rd and 24th October, part-I, part II and part III examinations were held respectively. I was a candidate for IMPCB part-III oral examination, after I passed part-I exam which was held in March, 2018 in Dhaka, Bangladesh, and part-II exam which was held in December, 2018 in ICTP, Italy. The examination was conducted at Barwa Tower 3, Suhaim bin Hamad Street, Doha, Qatar. It was a wonderful experience appearing a two and half hour oral exam in front of five different examiners in selected topics.

To sum up, IMPCB certification has become popular among medical physicists in different countries around the globe, which do not have their own certification programs for medical physicist. I hope IMPCB will conduct similar exams in regular intervals in different regions of the world.

AOCMP-2021

Welcome to The 21st Asia-Oceania Congress of Medical Physics Science for Radiation Medicine

Venue: Cox's Bazar, Bangladesh

Date: 10 – 12 December 2021

50th
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1971-2021

BANGLADESH

A Role Model for
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— Organizer —



Bangladesh Medical Physics Society

— In Cooperation With —



South Asia Centre for Medical Physics and Cancer Research

— Supported by —



The Asia-Oceania Federation of Organizations for Medical Physics



The main objectives of SCMPCR

To organize awareness, prevention, and screening program for cancer disease;

To provide adequate training to all personnel associated with cancer treatment;

To establish the clinical residency training program for medical physicists;

To develop the infrastructure of e-learning and library;

To establishment Welfare home for poor cancer patients;

To build a self-help group for cancer patients;

To establish a team who will assist in the management and quality control (QC) procedure for the diagnostic radiology equipment in the districts levels;

“SCMPCR was established in 3rd July 2018 is comprised of a group of philanthropic personnel with representatives from different regions of South Asia to work on different projects. SCMPCR is an autonomous body, under Alo Bhubon Trust (Alo -BT) and accountable to its board of trustees/governors. It is a non-profit public partnership which will seek support from other sources. It shall work conjointly with various nationals and international organizations. Major activities of SCMPCR are: to produce skilled manpower, enhance health education and establish a welfare home for cancer patients”

MISSION

TO Achieve UNDP
SDG-goal 3 & 4

OUR VISION

TO

PROVIDE QUALITY SERVICES IN
CANCER TREATMENT THROUGH
TRAINING, EDUCATION
INCLUDING
E- LEARNING IN
RADIOTHERAPY AND
IMAGING DISCIPLINES.

GOALS OF SCMPCR

Major activities of SCMPCR are to produce skilled manpower, enhance health education and establish a welfare home for cancer patients.

UNDP SDG-goal 3 (Good Health & Well-being)

Awareness program for the mass people for different communicable and non-communicable diseases, especially for cancer patients.

UNDP SDG-goal 4 (Quality Education)

Arranging and conducting training programs to develop skilled manpower. It realizes the need to educate specially; women regarding the screening and prevention of cancer treatment under UNDP SDG-goal 4.

SCMPCR

PROJECT of ALO BHUBON TRUST (Alo-BT)

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OUR MOTTO

QUALITY EDUCATION AND HEALTH SCIENCE FOR PATIENT BENEFIT

