South Asia Centre for Medical Physics and Cancer Research

SCMPCR

Newsletter

A Project of Alo Bhubon Trust (Alo-BT)

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MOTTO: Quality Education and Health Science for Patient Benefit

Inside this issue

Chairman's Message

In the past there have always been terrible pandemics such as Cholera, Smallpox, Plague, Spanish Influenza, Ebola or HIV. But the Covid -19 (Corono) is the hit (long-running burner). On March 12, 2020, the WHO declared this disease as a pandemic. The Covid-19 spreads like no other worldwide. The measures prescribed by the governments of most countries, the so-called lock down, should prevent the further spread of the pandemic. With the exception of system relevance facilities such as hospitals, pharmacies, medical practices and also grocery stores, all other shops and facilities should remain closed. In the event of unavoidable errands or shops, a minimum distance of 1.5 meters should be maintained and the necessary hygienic measures observed. The specified measures are intended to prevent the potential growth of the pandemic, but have a very large impact on the economy and the psyche of humans.

In Germany for example, the measures mentioned above try to keep the number of infected patients as low as possible. We stick to important key figures. First the doubling time and later the reproduction number was set as a benchmark. The reproduction number to be kept below that describes how many more people are infected by an infected person. In Germany, people are now gradually and carefully trying to allow the easing. Due to the loosening, the reproduction number could go up again quickly. For this reason, three other measures are used: using mask, increasing the number of tests and using apps to track infected people.

It is known from epidemiology that a herd immunity of the population (Approx. 60-70% of infected people) must be achieved by the corona infection survival or vaccination in order to avoid a further spread. A Global vaccine initiative has been started by the EU and the commissioner Dr. Ursula von der Lyen has proposed a budget of 7 billion euros (1.5 billion for testing, 2 for treatment and 4 for vaccination) to speed up the fight against the corona virus.

All governments should be encouraged to work together. This example could give us hope for overcoming the crisis in the foreseeable future. But we still have to be aware of the big problems of our time. Climate change is not only responsible for the destruction of our world, but will be the source of future diseases. Has humanity learned anything from Covid-19? Solidarity and cooperation work worldwide.

We could present in this issue the corona situation in the South Asia region. Besides you can find many interesting articles from South Asia region and beyond. I thanks all authors for their contributions and hope for a continuation in future. We request you-dear reader-to contribute by sending articles, reports and other information to make the Newsletter more interesting and useful. I wish all you a happy, peaceful and corona free world very soon.

Thank You

Prof. Dr. Golam Abu Zakaria
Chairman, SCMPCR

Editor's Notes

It is my great pleasure and privilege to contribute to this second issue of the SCMPCR newsletter as the editor-in-chief, we share recent SCMPCR highlights including SCMPCR activities during COVID-19 crisis in Bangaladesh, reports of coronavirus pandemic from other countries in South Asian region, South Asian cooperation in the time of coronavirus, featured articles and news & events.

The Covid-19 pandemic has changed lives around the world. The novel coronavirus has swept around the world and almost all nations have been affected. Therefore, thoughts on the future after COVID-19 on medical physicists professions are another additional interest and discussing in the current issue.

We also encourage you to start a dialogue with us and provide your feedback and suggestions about how our newsletter can be improved. Also please send us your contribution on or before October 2020 for the next issue which will be published in January 2021.

Thanks
Jeyasingam Jeyasugiththan
Editor-in-Chief (SCMPCR Newsletter)

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The COVID-19 pandemic was confirmed to have spread to Bangladesh on March 2020. The first three known cases were reported on 8 March 2020 by the country's epidemiology institute IEDCR. Infections stayed low till the end of March 2020 but show a steep rise in April. As of 26 June 2020, there were a total of 130,474 confirmed cases besides 53,133 recovered & 1661 deaths in the country.

South Asia Centre for Medical Physics and Cancer Research (SCMPCR) typically works to progress the cancer care scenario in Bangladesh as well as in South Asia through training workshop, seminar and cancer awareness program.

Figure 1: SCMPCR members are working at integrated control room, DGHS, Ministry of health, Bangladesh

SCMPCR Activities during COVID 19 Crisis in Bangladesh

But considering this evolving global health crisis, SCMPCR has taken the initiative with several actions to fight against COVID-19.

Working with DGHS, Ministry of Health:

As a response to this crisis from the March 2020 Directorate General of Health Services (DGHS), Ministry of Health, Bangladesh has opened an integrated Control Unit for overseeing and administering the coronavirus situation and to boost awareness among people about coronavirus. It has administrated a long unit wherever fifteen area specific team working in close co-ordination. The groups are – quarantine management, information communication and awareness, laboratory and diagnosis, contact tracing, protocol and guideline, orientation and training, hospital and patients care, legislative and supply, coordination, security and cleaning, partnership with development and Public-Private Partnership and oversight supervising and oversight monitoring, where the coordinator of information communication, awareness and PPP was Dr Md. Rizwanul Karim (Shameem). With response to this, Alo Bhubon Trust (Alo-BT) and its sister concern SCMPCR is mutually working with the administration especially the Directorate General of Health Services (DGHS), Ministry of Health. SCMPCR individuals joined with the integrated control room and work at the Public-Private Partnership groups under the coordination of Dr Md. Rizwanul Karim (Shameem). They outline the report with key messages and translated in Bangla language for people in general as indicated by the World Health Organization (WHO).

Raising Awareness Through Circulation of Posters, Leaflets and e-learning program:

Figure 2: Posters and Leaflets of SCMPCR to Raise Awareness

Meanwhile, SCMPCR has made a few PowerPoint, posters and pamphlets on Coronavirus (COVID-19) which has brought out oftentimes to the SCMPCR site, Facebook/Social media for creating awareness on the Corona Virus. Those materials were appropriated inside the mass individuals to bring issues to light. On 25th April an e-learning program was directed by Mr. Jobairul Islamand he a briefed on COVID-19.

Working with other Organization:

Other than these SCMPCR members circulates the international guidelines (IAEA and AFOMP) to the Radiotherapy and Nuclear Medicine divisions at the hour of COVID-19 crisis.

Relief Distribution Program:

To avoid the spreading of coronavirus the Bangladesh government has executed a complete lockdown since the 25th March. But this action has created difficulties for millions of people in the dense Bangladesh. The economic closure flashed by COVID-19 fears millions of people livings in the country imminently. Destitute individuals have lost their work and not getting any financial support. According to World Bank data, only 15% of Bangladesh's populace makes a salary of 500 Takas ($5.90) per day. Now around 10 million rickshaw drivers, daily wage earners, assembly line labours, house cleaners and others lost their capacity to oversee every day foods and they don't have any reserve funds to confront this circumstance. Considering this SCMPCR authority has shown a drive to support those individuals. Rather than dispersing food individually on the road, SCMPCR is attempting to accomplish something more feasible. SCMPCR authority is listing some needy families in various zones and giving food for two months. SCMPCR has begun to look for help from a few people and associations to help the poor people at this emergency and on 9th May Alo Bhubon Trust provided relief to the listed people in three distinct areas through a project.

Completion of online course on Covid-19 organized by the DGHS, Ministry of Health:

An online course has led by the DGHS, Ministry of Health through Muktopath (an online Govt e-learning platform). There are two types of course on COVID-19. One for general people and another one for the doctors. All are invited in this internet preparing on coronavirus (COVID-19). Through this course doctors can learn clinical management of Corona and registered their contact numbers on government hotline health portal so that they can consult any patients and general people course was prepared to enrich participants knowledge on COVID-19 and help corona affected people during this crisis. This preparation was sorted out to spread awareness messages about the COVID-19 to the overall population and the preparation is set up so that, anybody could finish the course whenever it might suit him by spending only 2 to 4 hours by interfacing on the website with their mobiles or laptops. The participants expected to finish the test assessment to proceed to the certificate. The members would have the option to download a declaration online in the wake of finishing the test and finishing the course. SCMPCR individuals has finished the online course with the

Figure 3: Relief Distribution Program

goal that they can help the people about COVID-19 and the CEO of SCMPCR Prof Dr. Hasin Anupama Azhari has finished the doctor's course and registered her number and Government helpline portal to consult patients during this crisis situation.

Conclusion: COVID-19 crisis has affected all of us. Yet, on the off chance that those of us who are in relative comfort approach to help the people those who are in crisis. We can come out of this crisis together. Country like Bangladesh and even in the developed countries the post-pandemic impact will be in an emergency regarding monetary, political, social and so forth. Then again, the thoughts, reasoning of medicinal services framework, instructive framework, the hierarchical framework will be seen in an alternate example sooner rather than later. Meanwhile, we have good experience from China, Europe, USA that despite developed countries, the health framework isn't suitable to deal with the crisis emergency. Rearranging the health system is one of the prime significances for living. In this way, SCMPCR is thinking how to conquer this post-pandemic impact and need to do research on the health systems is compulsory as quality health and education is our prime motto. This emergency is not going to end with current situation, so emergency management of this type of crisis without borders need to be think and special research should be done how to collaborate each other without thinking the leadership position in the world.

South Asian co-operation in the time of Corona

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Diseases famously know no borders. The present pandemic certainly is no exemption. It reveals the shortcomings of health systems even in the most advanced countries. And it is not just a health problem of epic proportions. We already feel the economic, social and political repercussions. In times of a recession it will be even more difficult to mend the problems in the health sector.

International solidarity would help. The system of international division of labour, the core of globalization, lifted millions out of poverty all over the world. The present crisis is a serious test of the system: Governments outright banned the export of medical supplies; richer ones out priced poorer ones. Instead of working together, world powers are engaged in a blame game, driven more by domestic politics than by global health concerns.

But there are also signs of cooperation across borders, not only in medical research, but also very practically by helping out with medical personnel, medical supplies and airlifting of patients from neighbouring countries.

The price of fighting the pandemic is that patients refrain from seeking help in hospitals fearing rejection or – in the case of admission – infection. On top of it, the worldwide economic recession makes it more difficult to raise the financial means, needed for the much needed improvements in the health sector.

An international exchange of experiences and knowledge makes systems more efficient. Developing best practices and effective drugs are difficult for larger, richer countries. Smaller and poorer ones have to rely on them. There are, of course, the international organizations and friendly donors. But it is neighbouring countries that should be most helpful, because they share the same conditions and face the same problems, not to speak of logistics. This certainly is the case in South Asia, where we find in all states a similar natural environment, similar cultures and traditions, similar diets and similar health systems. Languages might be not the same all over the subcontinent, but they reflect similar perceptions of illness, much needed when it comes to understand how patients describe their health problems.

The South Asian Association for Regional Cooperation (SAARC), founded by Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka in 1985 (Afghanistan joined in 2007) provides a forum for a regional exchange of experiences and ideas. Among SAARC's regional centres there is the SAARC Tuberculosis and HIV/AIDS Centre (STAC) in Kathmandu. There is a no SAARC centre for health, yet. But in an attempt to jointly fight the pandemic, there have been virtual meetings of senior politicians and health officials from the eight SAARC nations on the Covid-19 crisis. The first one was hosted by India on March 26, a second by Pakistan on April 23 besides video conferences and online capacity-building programmes. Given the sorry state of relations of the two major South Asian powers, not all had participation from all members. More cooperation would be needed. Covid-19 is not just a case for epidemiologists, virologists and pulmonologists: It has direct serious effects on many organs, besides indirect effects as it absorbs medical facilities needed for the treatment of other diseases.

It appears that the virus has developed different strains that are spreading differently in different regions. This would be another reason why regional cooperation is required.

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Thoughts on the future after COVID-19

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There is no doubt that the COVID-19 crisis is substantial and possibly constitutes the largest disruption many of us will see in our professional life. It is wonderful to see collaborations and the huge number of documents on COVID-19 and its impact on our patients, which were created by colleagues and made publicly available. This includes guidance documents by AFOMP (https://afomp.org/covid-19-information-resources/) and publications by many other medical physics groups and individuals (eg (1-4)). It is difficult to add anything concrete to this in particular as the situation changes every week. There are also significant differences amongst countries and the facts on the ground can even vary substantially across a country. One infected staff member can change the entire work force in an institution overnight, as many others would need to isolate themselves.

Given this, I will try to take a different look at the crisis and identify changes we have made in our hospital in response to the infection risks, which actually are worth keeping even after the immediate threat is over. I do this realizing two things:

a) Our institution, Peter MacCallum Cancer Centre in Melbourne, Australia, is fortunate to be well resourced and staffed, in particular in comparison with many hospitals in Bangladesh. However, I hope that the highlighted issues are relevant beyond our own environment.
b) There is very likely no way back to 'normal'. Some structural changes will not be reversible and it is very likely that there will be substantial damage to all economies, which will restrict our financial options in the future.

Overall, our society's perception of health care workers has changed. This is not only related to their importance for society and their larger risk of infection but also easily noticeable to the 'person on the street' as health care workers are moving about being required to commute to work even in a lock down.

It is therefore important to ensure that medical physicists are considered by everyone as health care workers who – at least at times – are required to have direct patient contact. In our institution, this has become visible when we tried to categorize hospital staff into 'patient facing' and 'non-patient facing' groups to segregate staff from each other to minimize infection risks and to plan for use of personal protective equipment (PPE). When we undertook this task, it became obvious that more than 30% of the physics staff in radiation oncology was actually 'patient facing' with activities such as brachytherapy, total body irradiation, motion management (eg 4DCT, gated CBCT), advanced imaging (contrast timing in treatment planning) and in vivo dosimetry requiring the physicists to be 'patient facing'. This has helped to clarify our role in the clinic.

An important change to our practice has also been the use of more hypofractionated treatments to reduce the number of times a patient has to come to the clinic and as such may be at risk of infection, and to make better use of resources including human resources in case RTT staff numbers are affected by COVID. It appears that some of these hypofractionated treatment courses (eg breast (5, 6) and prostate (7)) are here to stay. Given that hypofractionation often pushes dose constraints further, we see more intensity modulated plans requiring more physics input. And this is on top of the larger numbers of patients we will be able to treat in the future if hypofractionation remains.

I would like to thank the SCMPCR community and particularly Prof. Hasin Anupama Azhari for giving me an opportunity to give some personal comments on the impact of COVID on our professions as medical physicists. My perspective is that of a radiation oncology medical physicist working in a large department with more than 30 physicists and engineers on five campuses.

3D printed face mask (courtesy R Tino)

An interesting discussion in this context is also the utilization of brachytherapy and particularly intraoperative radiotherapy, which at least in principle requires less patient attendances (and more physics).

However, even with more physics need and requirements for patient contact, there are opportunities to perform at least some of the physics work remotely, protecting staff from the risk of infection. Provided internet connectivity is good, most treatment planning related tasks can be performed off-site, for example, by working from home. Our IT department has been working overtime to facilitate this transition due to the pressure of COVID and all physicists now have VPN access to the hospital network and as such can remotely access PACS, planning system and other hospital IT resources. Cybersecurity, patient confidentiality and workflows all had to be worked out and dual credentialing log-in enforced. However, I am confident that the infrastructure created will stay after the COVID crisis providing us with more flexibility to attend to our work.

Linked to the remote access are videoconferencing tools and protocols. Most of our departmental meetings are 'virtualized' to minimize contact of staff and ensure 'social distancing'. We have several systems in use, whatever the choice is security and confidentiality are essential. For the cost of a few webcams and headphones our workforce can now connect more effectively. In order to organize and structure work we also have introduced a morning tele-meeting where we check on each other (home or on-site) and ensure all tasks are attended to. This takes typically less than 20 minutes and has proven to be very helpful in our new routine. I am not sure why we have not done this prior to COVID but I am sure that it will stay in some form.

There have been other activities that are novel to our group and we are not sure how they will affect our future work practices. Telehealth has become an important aspect for everyone in the hospital as it keeps patients out of hospital and away from infection risks. Telemedicine, where patients are issued with remote controlled devices such as temperature or pressure sensors, is investigated by our biomedical engineering team and tele-radiology is in discussion. In addition to this staff in the Physical Sciences Department have been using additive manufacturing ("3D printing) for phantom development and bolus printing (8). Here we are exploring new uses such as face masks (see picture).

Without doubt one of the most important changes we have seen in COVID times is communication. We hold shorter meetings (who wants to wear headphones in front of a computer screen all day?) and need to do more preparation for them (how can one control a meeting with 20 staff without an agenda?). It is also much easier for the head of the department or the radiation safety officer to 'drop into' a meeting held in any of our campuses. This works not just within the medical physics group but also across other disciplines and communication between different professional groups has in general become better and more focused.

By changing work practices, we have become more aware of what we do and how valuable the contributions of every member of the team is. At least in my mind this has led to better team building even if we share coffee now only on screen.

Finally, we have learned how to wash our hands, wipe surfaces and clean equipment. Not a bad skill, which hopefully will stick around (unlike the virus).

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CORONA REPORTS FROM SOUTH ASIA

In South Asia, the first case was reported in Nepal on 13 January, 2020. The person returned from China on 5 January. Afghanistan has reported 30,451 cases with 683 deaths, Bangladesh has confirmed 130,474 cases with 1,661 deaths, Bhutan has reported seven confirmed cases, India has confirmed 497,359 cases and 15,401 deaths, Maldives has reported 2,277 cases and 8 deaths, Nepal has confirmed 11,755 cases, Pakistan has reported at least 15,401 confirmed cases with 3,962 deaths and Sri Lanka has confirmed 2,010 cases with 11 death until 26th June 2020. Afghanistan, Bangladesh, Pakistan and Maldives have implemented lockdowns, Sri Lanka has responded with quarantine curfews while India and Nepal have declared a country-wide lockdown.

Cancer patients and their families may feel especially worried especially about the virus spread, as cancer and its treatment can lower their immunity to fight against COVID-19. The people who are currently under chemotherapy or radical radiotherapy for lung cancer, who are at any stage of treatment for leukaemia, lymphoma or myeloma, who having immunotherapy or other continuing antibody treatments for cancer, who have had bone marrow or stem cell transplants in the last 6 months, or who are still taking immunosuppression drugs are more at risk if they develop the COVID-19 infection. In this article we report the current status of Corona issues in south Asian countries and the strategy used against COVID-19 pandemic to encourage the citizens and also cancer patients to follow particular measures to protect themselves.

Afghanistan

COVID-19 in Afghanistan

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When the unknown respiratory disease diagnosed for the first time in Wuhan, China in December 2019; unlike the general perception it spreaded very quickly across the globe. Afghanistan took the first step to control spread of the virus to the country, therefore all flights were cancelled with China and the people who were coming from China through other countries were strictly monitored in the portals. After the virus vastly spreaded in our neighbor country Iran; thousands of Afghan refugees living there were coming daily through the western border (Islam Qala) in Herat province before it closes. Control and monitoring of this wide scale people were very difficult hence; the government was not able to quarantine them for at least 14 days. When, the first case of COVID-19 pandemic was confirmed in the western province Herat on 24 Feb 2020, the local government made some restrictions on daily life in Herat province to slow down the spread of virus. But within two months the virus spreaded to all 34 provinces.

According to the ministry of public health as of May 7, 2020, there were 3392 active cases with 104 deaths and 445 recoveries in all over the country. The capital province Kabul has the highest number with 891 followed by Herat with 662 and Kandahar with 448 active cases. The government confirms some cases are from community spread and not connected to travel to Iran and other countries. It was said that the number of active cases in the country is far beyond of what is declared by the ministry of public health (MoPH), it is because of insufficient resources for COVID-19 testing that government has to test the patients. MoPH randomly tested 500 people by rapid testing method in Kabul City among them 260 were infected, this shows the severity of the catastrophe.

To facilitate the COVID 19 testing, in addition to the central public health lab and veterinary labs in Kabul, government established 5 zone labs in Herat, Balkh, Kandahar, Nangarhar and Paktya which are currently perform COVID-19 tests and a second veterinary lab in Heart is expected to begin testing in the coming days. All these labs have the capacity testing of around 1000 samples per day is too low and needs to be increased. To control the spread of the virus not only the testing but isolation centers for infected people are necessary, thus the government has converted darulaman Palace (300 beds), Kabul and polytechnic universities'' dormitories as isolations centers in Kabul. In addition to testing and isolation centers; public restrictions are needed to slow down the spread of the virus.

Afghan Government declared Kabul City, Herat, Farah, Jalalabad (Nangarhar), Asadabad (Kunar), Zaranj (Nimroz), Mazar (Balkh) on lockdown until further notice. All public places such as markets, restaurants, gyms, hotels, parks etc. are closed and the government offices except some entities with having lifesaving, security, food staff and financial related duties are open.

As per the report of MoPH Afghanistan is still not reached to the pick of the curve and the government is trying to enlarge the horizontal space of the curve to have enough time for health service providing. Anyhow, the situation gets worse and the number of infected people is rising every day and the government asks people to stay home to stay safe.

Bangladesh

Facing Corona Challenge

Professor Dr. Qazi Mushtaq Hussain

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We are passing through a critical time. Despite tremendous success in science and technology we are feeling helpless. Millions of people are affected and killed by this corona virus. But like all time only science has come forward to fight the virus and we hope that within a couple of days scientists will invent a vaccine for the deadly disease caused by this novel corona virus. Already some trials are going on.

In 2019 at Wuhan city of China this virus was first detected. It has spread throughout the world within a few days. Till date more than 4 million people have been affected and near 0.3 million died. Though more than a million of people has recovered, the death rate is high enough. After identification of the virus it was named as Corona virus or Wuhan virus but by February 2020 it was officially named as Covid-19. WHO nomenclature was CO for corona, V for virus, D for disease and 19 for 2019.

This is an RNA virus that has a protein covering. It contains some 'spiky projection' something like 'solar corona' which looks like a crown on the covering. In Latin corona means crown. So the naming of the virus is also interesting.

It resembles the virus that is commonly available in Bat and Pangolin and this is why it is thought that the virus came from the bat and pangolin.

The virus can enter our body through different ways like nose, mouth and eyes, coming from an affected person from sneezing or close contact like shaking hands, sitting side by side, touching face nose or eye by contaminated hands. It attacks the alveolus of our lung, destroying it and causes pneumonia. It also causes thrombus in our blood channels.

These two are main pathology in our body that causes mortality. It also causes some neurological symptoms like anosmia and loss of taste.

The first and common symptoms are like common viral attacks e.g. fever, running nose, pain throat and body that needs simple supportive treatment with antihistamine and paracetamol (80-85% cases). In severe case (15-20%) there is difficulty in respiration caused by destruction of lung alveoli that needs supply of oxygen by ventilators and in case of thrombus formation anti thrombotic treatment becomes essential which needs hospitalization. It takes around 2 weeks for recovery.

For prevention we need washing hands frequently or use of sanitizers. Avoid touching face, nose and mouth (humans touch face 23 times per hour), avoid crowd, maintaining social and physical distance. Using face mask for all is a very good option to prevent the virus from entering our body. Using personal protective equipment (PPE) for doctors and other healthcare providers is a must for their protection. Maintaining cleanliness of home and office is essential.

Male, female of all age may be affected though older people are more vulnerable due to age related diseases like diabetes, hypertension, renal diseases and chronic obstructive lung diseases.

The diagnostic test for Covid-19 is RT-PCR. It is done by collecting nasopharyngeal smear and finding a virus in it. Some serological tests are also available. The trial for a vaccine has already been started. Hopefully it will be available within few months.

Till then we have to protect ourselves by taking some special protective measures mentioned above.

In National Institute of Cancer Research and Hospital (NICRH) Dhaka, we have taken some measures for protecting ourselves. We are spreading disinfectant in the hospital premises; we have also established a flu corner for the patients coming with fever and cough. We are using thermal scanner to detect temperature of patients from a distance and sending patients to the flu corner who have raised body temperature. We have established a separate isolation ward for hospital stuffs if someone is suspected to have Covid-19. We are following 7/14 formula for the doctors and technicians to protect themselves from not being affected all at a same time. Doctors, nurses and technologists are using PPEs for their protection. We have made a Treatment Guideline on behalf of the 'Society of Radiation Oncologists' (BSRO) for the cancer patients during corona crisis.

We hope we will find the vaccine and other specific treatment for the viral disease. We are scientific beings and must rely on science. Sometimes people become restless and take some traditional or primordial medicine, but none of these are of value. Only scientific invention has helped mankind in the past and will do so in future.

Bhutan

Bhutan's Response to COVID-19 PandemiC:

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Bhutan confirmed its first COVID-19 case on March 06, a 76-year-old US male who travelled to the country via India was the patient. Around 90 people who came directly in contact with him, along with his 59-year-old partner, driver, and guide were quarantined.

After the news of the first positive case, people first headed for drug stores to buy masks and hand sanitizers and then headed for the markets to hoard up on essential supplies. Cars lined up in long lines at fuel pumps even the normally busy JDWNR Hospital was like a ghost building as patients decided to stay away. But the way the prime minister and the government, with His Majesty's guidance, handled the situation meticulously deserve our heartfelt appreciations.

In the wake of coronavirus pandemic, the Himalayan kingdom of Bhutan has closed down all its country's land borders and international borders with India and also restricted all the international crossings with effect from 22nd March and all schools have been closed countrywide, leaving almost 190,000 students to attend classes online. Printed learning material is distributed to students that do not have access to the internet, in addition to radio broadcasts.

Bhutan has been preparing for various scenarios as reflected in the stages of response in the National Preparedness Plan (currently orange). Currently, lots of efforts are going into running through various worst-case scenarios so that the government will be ready to respond to incase we do go into the Red zone.

The disclosure of the first Covid-19 positive case on 5 March had a record number of people running to the Flu Clinic set up by the Jigme Dorji Wangchuck Referral Hospital (JDWNRH), Thimphu. The flu clinic is open for 24/7. A lot of people were coming forward to check themselves for COVID-19, especially those who have been out of Bhutan and also people suffering from the common seasonal flu.

Medical Superintendent of Jigme Dorji Wangchuck National Referral Hospital (JDWNRH), Dr Gosar Pemba, said the patients and the health staff were asked to maintain a distance of one meter in order to minimize the risk of catching the flu and even the possible Covid-19. We use the case definition to screen the suspects. If there were any suspects, we try to minimize the contact time and immediately without doing much examination, we send the patient for testing and quarantine, and after that, if the result is negative, we could advise the patient to come back for further examination.

In case if any person has visited places where there are cases of COVID-19 then the person will be kept in the quarantine room in JDWNRH and the Royal Centre for Disease Control (RCDC) will test the sample taken from the patients. The person was kept in isolation until the result comes out. If the result tests negative then the person is advised to stay under home quarantine and take the necessary precautions at home.

Similarly, if the person is COVID-19 positive and then the relevant agencies will track down all the persons they have met in the last 14 days and advise them to remain inside their houses. For 14 days the person will be under observation because the incubation period is 14 days, said Dr Gosar.

Dr Gosar said that due to travel restriction in other countries, it will definitely reduce the chance of contracting COVID-19. The only danger is of its spread in India because border areas cannot be controlled.

"We never know, we could get a case but it may not be that much spread like a China as they have millions in population," said Dr Gosar.

So far, about 11,000 tests were conducted and only seven tested positive and five cases were recovered and about 1680 first contacts are being quarantined and about 400 secondary contacts are under self-quarantine.

As a religious country, rituals are being conducted in all dratsangs, shedras and goendeys to prevent the spread of the disease. The virus has disrupted life and businesses but things appear under control for now.

India

Guidelines on Radiation Therapy at Narayana Superspeciality Hospital during the COVID-19 Pandemic

Suresh Das

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There is an urgent need to share expertise and offer emergency guidance for radiation therapy (RT) during the COVID-19 (Coronavirus) pandemic. As per the World Health Organization (WHO) statement, our aim and obligation should be "to stop, contain, control, delay and reduce the impact of this virus at every opportunity". In our roles as healthcare professionals this translates to minimizing exposure of our patients to COVID19 without compromising oncological outcome. It is imperative that hospital visits are kept to the absolute minimum and that the complexity of RT planning/treatment is reduced where possible to ease pressure on our workforce. By adopting the recommendations where RT is minimized and targeted to those with the highest risk of relevant recurrence, we aim to protect our patients and health care professionals from potential exposure to COVID-19 as well as reducing the workload for health care providers and/or infrastructure at the moments that resources face strain due to the pandemic. A general guiding principle in this unusual setting in our hospital is that

1. Prostate cancer
   - If patient is responding to hormones and tolerating that, to defer external beam radiation therapy (RT)
   - For external beam RT, change to hypo-fractionated RT course
2. Breast cancer
   - In-situ breast cancer - defer RT
   - For localized breast cancer, treating breast only - for hypo-fractionated radiotherapy
3. Lung
   - Small cell lung cancer - prophylactic cranial RT (PCI) – defer
   - Small cell Lung cancer - Consider once daily treatment in place of BD treatments (45Gy in 15# Vs 45 Gy in 30#)
   - All palliative lung cancer - no more than 5 fractions
   - Non-small cell lung cancer - consider hypofractionation (55Gy in 20fr)
   - Consider deferral consolidation thoracic radiation for extensive stage disease.
4. Head and neck cancer
   - Only one fraction per day (i.e. no twice daily fractionation and none for 6F per week)
   - Defer routine naso-endoscopy investigations in routine follow-up if no cancer related symptoms
5. Brain
   - Glioblastoma elderly patients – for hypo-fractionated radiotherapy regime
   - Low grade brain tumours – defer
6. Gynaecologic Cancer
   - HDR brachytherapy – there will be limited ability to treat more than one fraction per day
7. Rectum
   - Consider short course (25Gy/5#) for neoadjuvant rectal treatments.
8. Palliative RT
   - All palliative radiotherapy limit to ≤5 Fractions

Happy Birthday, Wilhelm Conrad Roentgen!

(March 27, 1845- February 10, 1923)

Wilhelm Conrad Roentgen, a German physicist who was the first person to systematically produce and detect electromagnetic radiation in a wavelength range today known as x-rays or Roentgen rays.

Roentgen came upon X-rays while experimenting with electron beams in a special tube. He used these rays to create an image of his wife's hand on a photographic plate, revealing her bones. That's when he realized firsthand (pun intended!) the potential of X-rays in medical uses. While he was not the first to observe their effects, he was the first to systematically study them, which earned him the Rumford Medal of the Royal Society of London in 1896 and the first Nobel Prize in Physics in 1901.

Maldives

COVID-19 Pandemic – Situation in the Maldives

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Since the outbreak of Corona virus in China, Maldives had been preparing to face it and to control community spread. A Technical Advisory Group (TAG) which includes doctors and other expertise were formed. Measures were taken in accordance with the TAG team. A National Emergency Operations Centre (NEOC) with a task force was established and its spokesperson with members from the TAG team and other government officials has been holding press conferences in order to clear the situation of the global pandemic in the Maldives to the general public. A task force with an Emergency Operations Team was established in each island and they work under the guidance of NEOC. At the beginning the testing capacity and facilities were provided in Male' city But later medical equipment and testing kits were distributed other parts of the country. Quarantine facilities also was first established in Male' area then expanded to other parts of the country. Flu clinics and expatriate clinics were established in deferent parts in order to checking and testing.

The first case of Covid-19 was reported in the Maldives on 7th March 2020. It was a contact from an Italian tourist who was tested positive after leaving Maldives. From then onward, the resort island was put onto monitoring and many more samples were taken for testing. Since then, many measures were taken to control the spread of this disease, such as, putting some resort islands on quarantine and travel restrictions from some countries including China and Italy.

The first National Health Emergency was announced by the Health Minister regarding Covid-19 on 12th March 2020. Although until then there was no community spread but due to the positive 8 cases the government had ordered to close different tourist resorts, schools, colleges, university and government offices. Further, public gatherings were banned and keeping social distancing were enforced.

On 14th March 2020, people other than Maldivians were banned to travel from some European countries such as Spain, France, and Germany. Traveling from resort islands to other islands were restricted and tourists checking in to any local guest house was also restricted.

On 19th March 2020, government declared to quarantine anyone traveling from abroad for 14 day in any of the quarantine facilities and take legal measures on people who would go against the ruling. The first cured case was announced on 23rd March 2020. All the positive cases observed since then all positive cases were expatriates working in resorts. The first Maldivian was tested positive on 27th March, who was also working in a resort island.

On 15th April the first case was reported in Male' city. The person was taken to isolation facility, contact tracing had been done, many more positive cases were identified which includes people from general public, army, people working on delivery services, expats working in the country, etc. Until June 26, total positive cases are 2,277 among them which a higher percentage is expatriates working in the Maldives living in congested places. Government developed and still working on residential facilities to move people from those congested places. 421 were recovered and active cases are 1848. Total death was 8. Since the outbreak to the community, a curfew was announced to the Male' city. Traveling between the islands was also banned. Necessaries including medicines for the people were supplied by delivery services on online requests. There were shortcomings on these services as too many requests were coming on a very short time and delays were observed. Positive cases were identified from some other islands due to people travelled from Male' city just before the curfew. Their contact tracings were been done and many more cases are coming up.

Since the announcement of the National Health Emergency, all gatherings were restricted including the prayers on congregations in the mosques. People stuck on other countries were brought to the Maldives on special flights and were put into quarantine for 14 days and released if they tested negative after 14 days of quarantine. Airports and border were closed so are the resorts. Maldivians working in the resorts were allowed to travel to their respective island after 14 days of the last tourist left the resort, expatriates working in the resorts were given special allowances to travel to their respective countries on special flights.

In order to overcome this crisis, government is taking many measures. Strict measures were enforced regarding the curfew by the police and the army, maintaining social distancing, cleanliness, hand washing and use of hand sanitizers have been advocating. Social support groups and other humanitarian organizations are working to reach out the victims. On this economic crisis, government is also providing stimulus packages to the businesses and other people. It also is providing temporary wages to the people who lost their jobs or sent on no-pay leave. Furthermore, the government is working tirelessly with other countries to maintain the food, medical and other necessary supplies as Maldives depends very much on foreign imports. Many medical equipments especially necessary to control the COVID-19 are provided by other friendly countries.

As a whole, the situation or the spread of the disease seems to be still on a rise, and expected to reach a peak before it levels off and fall. Hence, the restrictive measures and the curfew was extended till 14th May 2020.

Source: Health Protection Agency of the Maldives. (4th May 2020), https://covid19.health.gov.mv/

Nepal

6-T strategy against COVID-19 in Nepal

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Medical Microbiologist

Dhiraj Shrestha
Public health scientist

After COVID-19 sprouted in Wuhan, China in late 2019, it attracted the concern of the world. By 11th March WHO had declared it as pandemic and public health emergency. Nepal, being a neighbour of China, only reported the first case on 13th January, 2020. With the increasing number of case, Nepal Government declared the lockdown throughout the country on 24th March 2020. As of 26 June 2020, 11,755 cases have been reported in Nepal with 27 deaths. Nepal has adopted the six-T strategy to fight the raging pandemic. The strategy was officially declared on 13th April 2020. Six-T includes, Travel restriction, Testing, Tracing, Tracking, Treatment and Togetherness.

1. Travel restriction

As COVID-19 spreads through human-to-human transmission, public crowd activities were discouraged using social distancing principle. Nepal was the first country to impose lockdown in South Asia on 24th March 2020, with travel restrictions inside the country. All national and international flights were suspended from 20th March 2020 till 7th May,2020. Road transportation was also restricted. International borders were also sealed.

2. Testing

Since the increase of cases, testing of COVID-19 using RT-PCR has been expanded in the 15 facilities throughout the country. Initially, Rapid Diagnostic Test (RDT) was also used for screening but later it has been abandoned as results were unreliable. As of 26th June 206,271 samples from suspected cases have been tested by RT-PCR, of which 11,755 were confirmed positive for COVID-19. The number of testing is still increasing to identify the infected cases. Medical Microbiologist, Lab scientist and other lab professional plays the crucial role in testing the COVID-19 disease.

3. Tracing

In Nepal, as of 26 June 2020, 11,755 cases have been confirmed by RT-PCR, of which 2,698 are already cured. Contact tracing has been done on all confirmed cases and all traced individuals have been tested for COVID-19 infection. By doing this further spread of COVID-19 in community has been avoided. Furthermore, areas with higher cases, traced by contact tracing, have been sealed to stop the community spreading .

4. Tracking

All confirmed cases are being treated under strict monitoring and isolation. Only a few designated healthcare professionals wearing PPEs comes in close contact with cases for treatment. This isolation and tracking of the confirmed cases have avoided the spread to the community.

5. Treatment

All the RT-PCR confirmed cases had been referred to treatment under isolation. All preventive measures were being undertaken by the healthcare professionals who were responsible for treatment of cases. Nepal government has declared that it will bear the cost for all the cases. Since all the confirmed cases are mild till to date no intensive treatment has been required. Those people returning from the foreign countries were held in compulsory two week quarantine. As of 29th April 2020, 22,901 individuals are being held in quarantine and 87 individuals in isolation throughout the country.

6. Togetherness

Since pandemic public health emergency demands co-operation among several concerned parties. Nepal government is closely coordinating with WHO regarding the pandemic issues. Nepal government has been in continuous co-operation with private sectors, foreign countries and foreign agencies for implementing the effective measures. Nepalese citizens are also co-operating with authorities.

Conclusion

Despite the efforts made, Nepal is already in the third stage of the outbreak. The COVID-19 has already tested the healthcare system of the developed countries in Europe and USA, and rendered them ineffective. With limited infrastructures and healthcare professionals, Nepal will hardly be able to cope with the outbreak. The six-T strategy is now proving effective in containing the COVID-19 in third stage of outbreak in Nepal.

Pakistan

Radiotherapy Services during COVID-19 Pandemics

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Radiotherapy plays an important role in the management of cancer. Around 60% of cancer patients require radiotherapy at one point on another during their course of disease. Once radiotherapy treatment has started then it is recommended that it should be completed without any treatment delay. This should be very challenging in the presence of COVID-19 pandemics. The World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern (PHEIC) on January 30, 2020. Unfortunately there is no vaccine available of this virus yet.

However every country of the world is facing lockdown situation to reduce the spread of the virus. In Pakistan, We are facing lockdown situation from March 23, 2020 and it has been extended multiple times and probably will be end on May 09, 2020. In our department we have two Elekta Linear accelerators. In which one is newly installed VERSA HD along with Elekta synergy linear accelerators and also we have one Elekta high dose rate Brachytherapy unit. We are using Monaco as a treatment planning system and Mosaiq as an Oncology system. Our one Elekta Synergy machine has been gone for upgradation.

When the pandemics started then our management made following policy. All radiation oncology team committed to provide safe radiotherapy services to our patients.

Our Policy

1. Reduce the number of patients.
2. No new patients will be enrolled for radiotherapy.
3. Only patients whom will require radiotherapy on urgent basics will be accommodated.
4. Prepare a list to priorities their patients for radiotherapy by the consultants.
5. Instead of conventional fractional prescribe hypofractionation.
6. All patients should screen before receiving radiotherapy.
7. All Radiotherapy Staff will divide in two groups and each group will come on alternate days.
8. Reduce duty hours.
9. The Personnel protective equipment (PPE) issue for all radiotherapy staff.
10. After every radiotherapy session RTT should clean all used accessories.
11. Chlorine Disinfectant solution should be spray at the end of the day.

Happy Birthday, A Bengal Physicist Satyendra Nath Bose!

(January 1, 1894 – February 4, 1974)

Satyendra Nath Bose was a Bengali physicist. He is best known for his contribution to Bose-Einstein statistics and condensate. He is honored as the namesake of the boson. Bose joined the newly established Dhaka University in 1921 as a Reader of the Department of Physics and later became the Head of the department. While working at Dhaka University, SN Bose worked hard in establishing the department and sincerely performed research work for twenty years at a stretch. In this period, his research on Theoretical Physics and X-ray Crystallography made him celebrity worldwide.

In 1924, Bose published his celebrated article entitled 'Planks Law and the Light Quantum Hypothesis'.The great physicist Albert Einstein appraised the article and translated it into German language. He also made proper arrangements to focus the hypothesis to the scientists through publishing it in science journals. The hypothesis received a great attention and was highly appreciated by the scientists. It became famous to the scientists as 'Bose-Einstein Theory'.A self-taught scholar and a polymath, he had a wide range of interests in varied fields including physics, mathematics, chemistry, biology, mineralogy, philosophy, arts, literature, and music. He served on many research and development committees in sovereign India.

Bose never got a Ph.D. degree. He could easily have been awarded one for his invention of quantum statistics, but he was a very modest man; he was content to have made the discovery; he did not need the title 'doctor.' A Fellow of the Royal Society, he was awarded India's second highest civilian award, the Padma Vibhushan in 1954 by the Government of India.

Sri Lanka

The COVID-19 Crisis – experience from Sri Lanka

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The Covid-19 pandemic has undoubtedly become an era-defining challenge world over. It has implications not only in the public health sector, but also in the global economy and political landscape. The prevention strategy followed is unique to Sri Lanka. The Government of Sri Lanka and the Ministry of Health adopted a policy of pre-emptive quarantining and isolation of suspected contacts even before they developed symptoms. This approach was proven to reduce the margin of error as seen by the spread being limited to clusters, as opposed to the spread in community which wasn't seen for a long time. However, due to several lapses community transmission was inevitable overtime. The relaxation of strict social/physical distancing measures is threatening community transmission making it harder to contain the transmission and bring outbreaks under control through contact tracing.

During the early months of the pandemic a mathematical model for prediction was developed by Sri Lanka Medical Association's Vice President Prof. Manuj Weerasinghe and Dr. Nishantha Perera from the Department of Mathematics of the University of Colombo (UOC). According to their predictions, tight control was required to maintain a manageable patient load; the maximum number of coronavirus cases we can handle at the moment is around 2,000, and anything more than that will put the healthcare system in serious jeopardy. (figure 1) In this regard two strategies were possible;

Flattening the curve also known as a mitigation strategy, which focuses on slowing but not necessarily stopping epidemic spread by reducing peak healthcare demand while protecting those most at risk of severe disease from infection.

Hammer and the dance method, this is total suppression, which aims to reverse epidemic growth, reducing case numbers to low levels and maintaining that situation indefinitely. However, each policy has major challenges since at bare minimum essential services needed to function. (Figure 2)

In Sri Lanka, the hammer and the dance method was followed. This was the opinion of the experts considering the strength of Sri Lanka's public health system. The available data is

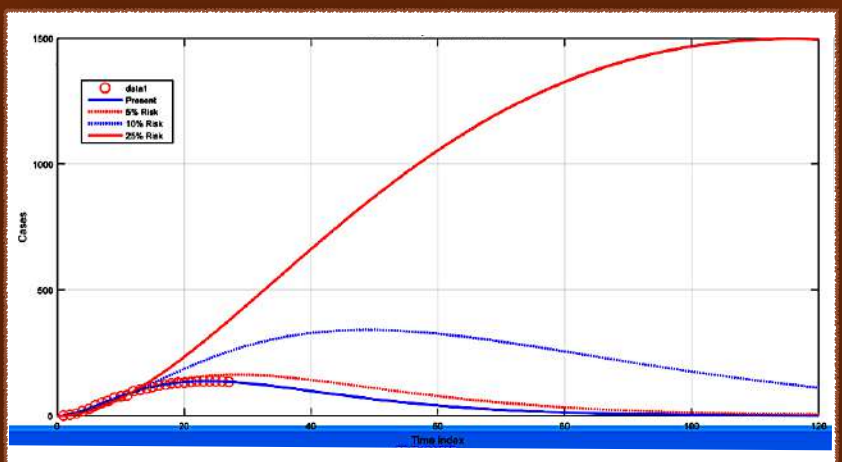

Figure 1: Covid-19 prediction model

Testing strategy

changing every day hence we needed to take a dynamic approach while monitoring the local trends very closely. According to the World Health Organisation (WHO), diagnostic testing is critical for management, surveillance of carriers, understanding the epidemiology, and suppressing the transmission of Covid-19. Testing is our window into the spread of this disease with so many unknowns, as it allows us to identify infected individuals in the fight to slow down and reduce its impact globally. It is no doubt that the spread of the virus has overwhelmed health systems in many countries. Hence, testing remains the most powerful tool in curbing the spread of the pandemic. However, there should be a strategic deployment of testing to utilize available resources cost-effectively, especially in a low to middle-income country like Sri Lanka.

Owing to the highly infectious nature of Covid-19 and its associated high mortality rate in vulnerable groups of individuals, we need to identify infected individuals very early on to isolate them. Also, contact tracing is crucial to curb the spread. In order to contain such an epidemic, it is vital to have a well-planned testing strategy. Since WHO notified the first cases of what we now call Covid-19, their strategic plan has seen significant modifications. One of the main insights gained thus far is that the faster all cases are found,

tested, and isolated, the harder we make it for this virus to spread. This principle will save lives and mitigate the economic impact of the pandemic. Countries are at different stages of the outbreak. Thus far, we have been able to deliver quality clinical care and reduce secondary mortality without compromising the healthcare system. However, we will now have to look at a plan for a phased transition, whilst enabling the resumption of some parts of economic and social life. This had to be prioritized by carefully balancing socioeconomic benefit and

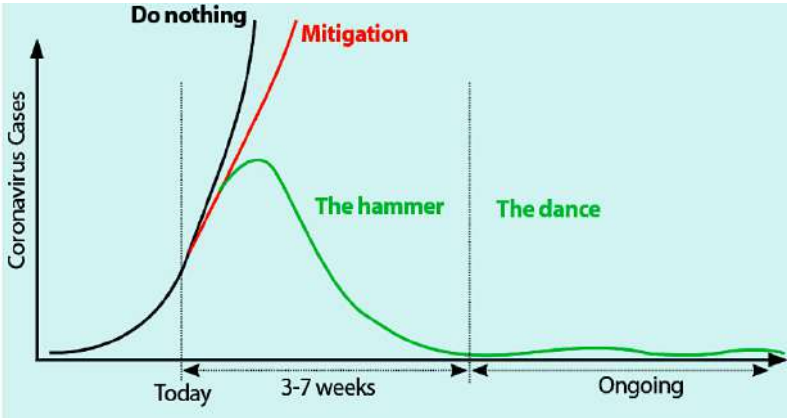

Figure 2: The hammer and the dance method

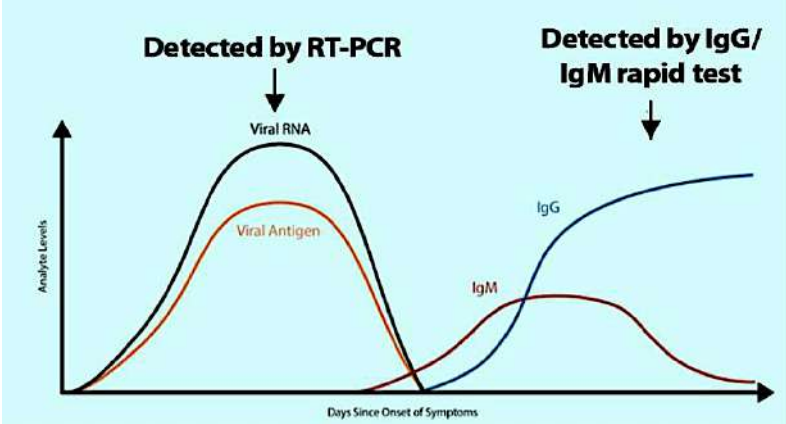

Figure 3: RT-PCR test

Current testing methods recommended in SL

epidemiological risk, as the premature lifting of physical distancing measures is likely to lead to an uncontrolled resurgence in Covid-19 transmission, propagating an amplified second wave of cases. The WHO and all global infectious disease organizations recommend PCR assay as the test for the identification of Covid-19. The detection rate by PCR ranges from 60-90%. It can be as high as 90% in freshly collected samples if transported early on, and it varies depending on specimen type, collection method, and possible sample collector/investigator variability.

Although there are IgM and IgG rapid detection and POC (point of care) assays available, they are of limited use and are not recommended in Sri Lanka. This is because the majority of patients develop antibodies in detectable levels to the Covid-19 infection usually 10 days or more after the onset of symptoms. (figure 3).

Therefore, these rapid antibody tests have no value in early case detection. Negative test results in the early phase of the disease may provide false assurance. Hence, it could be tempting to relax control measures such as self-isolation by contacts which can contribute to aggravating community transmission. Community-based PCR testing is currently performed. The usual recommendations are samples taken from nasopharyngeal swabs or sputum of patients. A sputum sample is preferred in those who can produce sputum. These samples are collected and sent under strict guidelines issued by the Ministry of Health. Aggressive testing should be carried out in all suspected patients, their contacts, and those living in high-risk regions. Sometimes, if the individuals have had an asymptomatic infection and recovered, if you do a PCR, it would not be picked up. However, they could have spread the infection while they had the virus in the respiratory secretions. Therefore, antibody detection by carrying out ELISA (enzyme-linked immunosorbent assay) for SARS-CoV2-specific IgM and IgG is very helpful in such situations and for community screening. Many countries use the ELISA method to detect these antibodies in contact tracing and to find out the extent of infection in a community.

Frugal innovations in response to COVID

Over 100 countries are now dealing with the Covid crisis and the healthcare foot print in each country is unique as its dynamic (Figure 4). Low resource countries are increasingly recognized as sources of frugal healthcare innovations. These innovations offer the potential for cost savings. There has been an extraordinary demand for personal protective equipment (PPE) and deficiencies in their supply chain could potentially collapse a healthcare system as protecting the frontline staff is critical in our fight against Covid. However, necessity is the mother of all inventions, and healthcare workers have stepped up to meet this growing demand by making cost-effective medical supplies such as masks, protective gear, disinfection chambers, and more. These improvised PPEs needs to be efficient

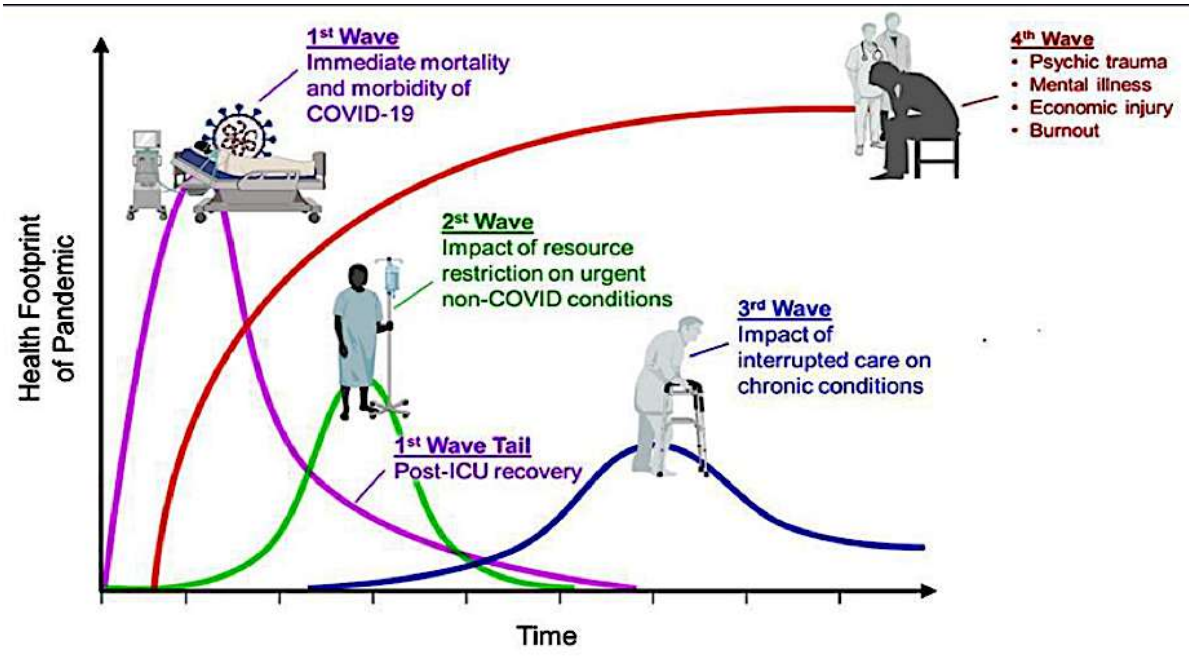

Figure 4: Health footprint of a

and cost-effective at the same time. Frugal innovations are also a source of new ideas, enabling middle-income countries to broaden their horizons while leveling the playing field in global knowledge production. The resource constraints that are faced by health systems, can benefit by adopting frugal innovations which is timely and needed. A system should be put in place to harness local hidden talents and encourage the development of more such need-based equipment. Such ideas should be evaluated by experts and resources should be allocated as needed. Such innovations can be useful not only for COVID 19 but also for other diseases.

Safety of healthcare workers

Healthcare workers in the frontline should be protected as their exposure to hazards put them at risk of infection with COVID-19. These particular occupational constraints include not only the exposure to the pathogen but also long working hours, psychological distress, fatigue, occupational burnout, and stigma to name a few. It is a national responsibility that they're provided with adequate IPC (infection prevention and control) and PPE supplies (masks, gloves, goggles, gowns, hand sanitizer, soap and water, cleaning supplies) and in sufficient quantity. The world health organization and other global stakeholders including governments are evaluating and investigating the usefulness of early preventive measures, which are of paramount importance to provide timely advice on measures to protect people's health and prevent the spread of this outbreak.

In light of this, healthcare workers mustn't become carriers of this infection. Wearing a medical-grade mask is one of the preventive measures to limit the spread of certain respiratory diseases, including Covid 19. However according to the rational use of personal protective equipment (PPE) for coronavirus disease, an interim guideline issued by WHO has highlighted the importance of covering the rest of the face using a face shield while wearing a surgical mask to provide the adequate level of protection, for the health staff who are in direct contact with Covid 19 patients, or procedures that stimulate coughing and promote the generation of aerosols performed on them. However, the commercially available face shields are costly and are not freely available in large quantities on a scale that is required in the face of a pandemic such as this. In response to this growing demand there has been a surge in the innovation sector in Sri Lanka which is one positive impact of the crisis.

Sri Lanka

Cancer Care in Sri Lanka during the COVID-19 pandemic

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The novel coronavirus-SARS-COV-2, COVID-19 spread around the world since first being identified in Wuhan, China on December 19. It leads to send billions of people into lockdown. People are in a very pathetic situation all over the planet. This outbreak of COVID-19 has been declared as pandemic by world health organization (WHO). According to the World Health Organization report, as of 26th of June 2019, there have been reported 9581803 confirmed cases of COVID-19, including 489182 deaths over 213 countries [1].

In Sri Lanka, the very first coronavirus infected case was reported on 27th January 2020. Indeed, in this first reported case, 43 years old Chinese women from Hubei, China was admitted with COVID-19 infection to the National Institute of Infectious Diseases, Colombo, Sri Lanka. Following, the first national Sri Lankan who was a tourist guide for Italian tourist was identified positive for COVID-19 on 10th March 2020. As of 26th of June 2020, 2010 confirmed cases of COVID-19 have been reported among which 11 have died while 1619 have recovered. The capital of Sri Lanka, Colombo is highly affected for this pandemic [2]. Once the first national Sri Lankan have been identified with COVID-19 positive, the stringent measures have been taken against coronavirus pandemic by Sri Lankan government in different forms. Even though, it seems controlling this COVID-19 pandemic is a challenging task not only for Sri Lanka but also for all other countries which are affected from this coronavirus infection.

Cancer is a second leading cause of death in Sri Lanka. The most common cancer is Lip/Oral cancer in men and Breast cancer in women. In 2018, the recorded number of new cases were 23530 and the number of deaths were 14013 [3]. Looking at the government cancer treatment centers in Sri Lanka, there are 24 treatment centers among which only 7 hospitals have radiotherapy treatment facilities. Moreover, there are two private hospitals provide radiotherapy treatment [4].

The interim guideline has been developed for the cancer patient management during the prevailing situation of COVID-19 pandemic with the recommendations of college of oncologists.

Therefore, the cancer treatment centers currently follow the interim guide line suggestions during this COVID-19 disaster. The suggestions are following, the follow-up can be deferred for the patients who have completed the treatment; for patients who taking long-term anti-cancer drugs without the risk of immunosuppression, individual oncology units should facilitate the administration of these drugs by minimizing contact between individuals, for example the drugs can be given for a minimum of 2 months; for patients currently receiving systemic anticancer drugs who are at risk for suppression of the immune system, ongoing treatment should be considered as a factor that weighs more risks and benefits; new patients waiting for the start of systemic anticancer medicine should have their treatment decisions after reviewing and discussing the risks and benefits, it means that treatment may delay for some patients; consider delaying the initiation of radiotherapy (for example, prostate cancer) for a reasonable amount of time, to minimize hospital visits, hypo-fractional treatment plans could be considered for appropriate cases; patients who respond to systemic anticancer treatment and who meet the current definition of suspected COVID-19 infection should follow national guidelines and find the recommended centers [5].

To conclude, all medical staff work tirelessly in Sri Lanka to care the patients not only in cancer treatment centers but also in all hospitals island wide. In addition, it is hard to predict about the future perspectives of battel against COVID-19 outbreak.

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Advance In-Service Clinical Training for Nuclear Medicine Physicians by a German Nuclear Medicine Physician

Bangladesh is a small country of only 147,570 sq. km in the eastern part of the South Asia. Rapid development has occurred in health services in Bangladesh in last decade. Keeping pace with that nuclear medicine services are also expanding. At present in Bangladesh, more than 20 nuclear medicine centers are functioning in different parts of the country covering almost all the corners. These centers are run by Bangladesh Atomic Energy Commission (BAEC). But if we compare it to other developed or developing countries of Southeast Asia, still we are lagging far behind. Besides all shortage of manpower is probably the most important obstacle in expansion or development of nuclear medicine in Bangladesh. Bangladesh definitely needs expansion of nuclear medicine facilities to serve more than 160 million people of the country.

The increasing complexity of both treatment and diagnostic modern equipment coupled with the raising of the expectations of good health care in Bangladesh, as well as the implementation of advanced clinical practices. In-service training is a key strategic approach for supporting continued competence of the health care workforce and to reduce the gaps between treatment outcomes. As we know, this type of training provides more benefits than foreign training where daily problems can be solved and discuss immediately and knowledge can be shared according to country base problems.

The South Asia Centre for Medical Physics and Cancer Research (SCMPCR) has taken a great initiative in education and clinical training of manpower related to cancer care through workshop, seminar and in-service training. With the vision of developing competent man power in Nuclear Medicine sector a joint venture of SCMPCR and BAEC with the support of a German Organization Senior Experten Service (SES) was brought a Senior Expert Dr. Fried Rolf Schaffhauser for a seminar cum workshop and in-service training titled "SCMPCR-SES Hands-on Training (HT- 03): Advance clinical training for the Nuclear Medicine Physicians" from 1st February to 18th February 2020 in different hospitals, institutes, universities. Dr. Fried Rolf Schaffhauser, (Former Assistant Medical Director and Senior Doctor Department of Nuclear Medicine, Clinic Fichtelgebirge Marktredwitz, Germany) is an expert on nuclear medicine (positron emission tomography, Ultrasound, Thyroid section, Sonography, etc).

Department of Medical Physics and Biomedical Engineering, Gono Bishwabidyalay

First Dr. Fried Rolf Schaffhauser visited to Medical Physics and Biomedical Engineering Department, Gono Bishwabidyalay (University) on 03 February,2020. A daylong seminar was organized at Medical Physics and Biomedical Engineering Department, Gono Bishwabidyalay (University). In the seminar Dr. Rolf discussed about the quality control (QC) for equipment which is the part of the daily routine for Medical Physicist and Physician. Also, he described that how quality control is done in Germany. At last, he showed the QC guidelines for Nuclear Medicine center. The seminar was ended through the question answer session.

Central Police Hospital, Rajarbag, Dhaka, Bangladesh Atomic Energy Commission (BAEC)

On 4th February, 20th anniversary of World Cancer Day, was celebrated by SCMPCR arranged a cancer awareness program in Central Police Hospital, Rajarbagh, Dhaka. Dr. Fried Rolf Schaffhauser was invited to deliver a talk in the event. The topic was "Risk factors for cancer development" and "Cancer screening in Germany" and he discussed cancer treatment in Bangladesh by comparing with the method used in Germany. All the doctors and nurses diligently approached the seminar and they said that they had

benefited immensely. In the meantime, Dr. Rolf, Prof. Hasin Anupama Azhari and Mr. Md. Jobairul Islam visited to the Bangladesh Atom Energy Commission (BAEC) and meet with Prof. Dr. Md. Sanowar Hossain (Chairman, BAEC). Prof. Dr. Md. Sanowar Hossain thanked to SCMPCR for arranging this type of in-service training. Also Dr. Rolf visited Square Hospital, National center for Cervical and Breast Cancer Screening and training, BSMMU.

Institute of Nuclear Medicine & Allied Science (INMAS), DMCH, Dhaka

A five daylong in-service training was conducted in Institute of Nuclear Medicine & Allied Science (INMAS), DMCH, Dhaka from 05 February- 11 February 2020. On 5th February the program was started at 10:00 am by the meeting with Prof. Dr. Mahbub ur Rahman (Director) of the INMAS, Dhaka. During the meeting they have a discussion about the work plan of these days. In 5 days, he observed at different sectors (Ultrasonography Division, Thyroid Division, Scintigraphy Division, PET-CT division) of Nuclear Medicine and shared his comments to all responsible physicians. Daily problems were discussed and solved with the experts immediately and he has also recommended some new techniques for the diagnosis. He also recommended some procedure to the doctors for Abdominal Ultrasound, Thyroid metastases and renal scintigraphy division. He also suggested to radioprotection division for one should use always a radio-protection shield for syringes with radioactivity in it because of radiation protection of the fingers. On his last day at INMAS, he presented a lecture about diagnostic paths in diseases of thyroid as recommended by ETA (European Thyroid Association) and as they do them in Germany, including additional scintigraphy of "cold nodes" of the thyroid with ^{99m}Tc-MIBI in some cases. And he reported about Sentinel-Lymph-Node-Scintigraphy and –Detection with some kinds of cancer, especially with breast cancer. Afterwards he had a good and long discussion and the training was concluded with a friendly farewell.

National Institute of Nuclear Medicine & Allied Science, BSMMU, Dhaka.

After finishing the INMAS program, next in-service training program was conducted in National Institute of Nuclear Medicine & Allied Science (NINMAS), BSMMU, Dhaka from 12th February- 18th February 2020. The first day program of NINMAS was started at 10:00 am by the meeting with Prof. Dr. Nurun Nahar (Director), Dr. Jasmine Ara Haque, Dr. Shamim Momtaz Ferdousi Begum of the NINMAS, Dhaka. They discussed on present situation of Nuclear Medicine in Bangladesh and showed him to schedule during the program. During the program, Dr. Rolf spent the time at Thyroid Division, Scintigraphy Division, Ultrasound & Color Doppler Division, PET-CT Division of NINMAS. They discussed everyday with specific division and also solved the problem with the experts immediately and he has also recommended some new techniques for the diagnosis.

In Thyroid division, he shared his knowledge of expertise about patients. He said, "In Germany all therapies with 131-I must be carried out under inpatient condition, in Bangladesh only cancer-patients and in Germany in ultrasound they look for the volume of thyroids, in Bangladesh only the diameter from the front to the rear capsule". Feces and urine of these patients in Bangladesh go directly to sewers. He suggested the authority to reserve those for several month as like they do in Germany. He also said in Germany 131-I-Uptake with patients with benign diseases of thyroid are only made and in Bangladesh the doctors look for the uptake for 131-I frequently, also in the diagnosis of benign diseases, even if no therapy with 131-I is planned. Dr. Rolf spent two days at the scintigraphy division. He shared his knowledge about bone Scan, MPI, Renal study Thyroid Scan, HIDA scan and Parathyroid scan with Physicians.

He expressed his views about our work exchange his views on scintigraphy & give some advice. He also mentioned that in Germany the indication for an examination with radiopharmaceuticals always is made by a specialist for nuclear medicine and not by the doctor referring the patient. He also delivered a PowerPoint presentation for this division. Likewise he spent time at ultrasonography division and suggested some new techniques for the diagnosis.

Pacemaker Royal Medical Academy, Dhaka.

In the meantime, SCMPCR organized a seminar cum workshop at Pacemaker Royal Medical Academy, Dhaka on 15 February 2020. Dr. Rolf discussed on "Importance of sonography in thyroid diagnostics – sonographical thyroid nodule, what to do?" and Prof. Dr. Hasin Anupama Azhari discussed on "New developments in image based gynecological brachytherapy". After the seminar, he showed some practical session on ultrasound. In this workshop more than 120 physicians participated.

On 2nd February he visited SCMPCR office and received a memorandum from the CEO of SCMPCR Prof. Dr. Hasin Anupama Azhari and addressing his opinion regarding the outcome of the workshop.

In the whole journey of Dr. Rolf in Bangladesh, Mr. Jobairul Islam (Program Officer, SCMPCR) was ways accompanied with him and also taken to visit some historical and beautiful places in Savar. Dhaka.

It was really a wonderful assignment which makes a big positive impact to improve health care facilities of the hospitals in the field of Nuclear Medicine. SCMPCR authority is very grateful to Dr. Fried Rolf Schaffhauser and all the hospitals/institute authorities, Staffs and BAEC for their Support and co-operation and make this event successful.

Dr. Rolf Schaffhauser visited the National Institute of Nuclear Medicine & Allied Sciences from 12-18th February. During his stay, his ewe discussed Thyroid disease, investigations and I131 therapy in thyroid cancer & thyrotoxicosis. Different radio isotope seems like MPI, Parathyroid, Thyroid, bone renal, HIDA and others and also abdominal & neck ultrasound. We also discussed about-sentinel lymph node mapping.

We found his stay useful and our doctors & Scientists improved their knowledge from him. I think sharing of knowledge by such expert visit is important. I would like to thank the South Asia Centre For Medical Physics and Cancer Research (SCMPCR) for organizing such an event. We hope to join such events in the future also.

Prof. Dr. Nurun Nahar
Director, National Institute of Nuclear Medicine & Allied Science (NINMAS),
BSMMU, Shahbag, Dhaka.

The workshop performed by Dr. Rolf started here in INMUS Dhaka for 5 days. He worked to exchange views along with his and our experts and doctors. And shared his experience with us and it has been fruitful for us. He presented a slide on Thyroid diseases. I do wish for him to gather our experience and being beautiful also.

Thank you with regards

Dr. Mahbub Ur Rahman
Professor and Director,Institute of Nuclear Medicine & Allied Science (INMAS), DMCH Campus, Dhaka

Celebration of World Cancer Day-2020: Spreading awareness among hospital staffs of Central Police Hospital

Every year, the South Asia Centre for Medical Physics and Cancer Research (SCMPCR) organizes the World Cancer Day on February 4 to raise awareness in Bangladesh to put an end to the injustice of "Preventable Suffering" from cancer. This year, "I am and I will" is the theme and it acknowledges that everyone has the capacity to act in the face of cancer.

According to the American Society of Cancer Oncology (ASCO), Cancer is the 6th leading cause of death and accounts for 10% of all mortality in Bangladesh. Based on two hospital-based cancer registries, nearly 66% of patients with cancer are estimated to be within the age bracket of 30 to 65 years and constitute the main workforce structure in the country. Breast, esophageal, and cervical cancers are the most common cancers by incidence in Bangladesh. However, esophageal, lung and pharyngeal cancers account for the highest rates of cancer-related mortality. The incidence of cancers is expected to rise from 136,719 cases in 2015 to 250,726 cases in 2035. Lung cancer is the most common cancer in men in Bangladesh, and 48.3% of men smoke tobacco. With tobacco being one of the most important modifiable cancer risk factors, Bangladesh has implemented an action plan for tobacco control. The prevalence of obesity in Bangladesh is quite low, at 3.3%. This rate is likely due to the high percentage (16.4%) of the population consuming a suboptimal amount of nutrition for minimal energy expenditure. With less than 1 hospital bed (0.6) and a physician (0.36) per 1,000 people, Bangladesh is generally unable to provide adequate treatment facilities for cancer management. To meet this significant and growing health challenge, a trust has been established under the name of Alo Bhubon Trust (Alo-BT). South Asia Centre for Medical Physics and Cancer Research (SCMPCR) is a project of Alo-BT, and it's one of the missions is to create public awareness and establish cancer screening programs.

"Prevention is Better than Cure" from this belief to reduce the mortality and suffering for cancer, every year SCMPCR organizes cancer awareness program. This time on 4th February 2020, SCMPCR has celebrated the 20th anniversary of World Cancer Day in Central Police Hospital, Rajarbagh, Dhaka. This program was acknowledged by the Central Police Hospital, German Academic Exchange Service (DAAD) and Mannheim University Hospital.

All the nurses and some doctors from central police hospitals have joined in this seminar. Many guests were invited for this awareness program, notable among them Prof. Dr. Hasin Anupama Azhari, Dr. Mohibur Hossain Nirob, Dr. Dewan Shahiduzzaman was presented as an Invited speaker. Among the foreign invited speaker was Dr. Med Rolf Schaffhauser. Dr. S.M. Shahidul Islam, PPM, SP, Central Police Hospital was presented as a chief guest. Dr. S M Mustafizur Rahman was also present as a guest from the Central Police Hospital.

Dr. Mohibur Hossain Nirob points out the many good and bad aspects of chemotherapy. He has raised a strong awareness of what to do if the early symptoms of cancer are present and have given guidance on what the next steps will be for the cancer patient. Prof. Dr. Hasin Anupama Azhari outlined the current cancer context in Bangladesh and mentioned the role of radiotherapy on cancer. She emphasized that fresh air, fresh foods, and healthy life leading are a huge role in preventing cancer. She highlighted a particularly important discussion about breast and cervical cancer in women. Dr. Med Rolf Schaffhauser points out the differences and problems of cancer treatment in Bangladesh with the method of cancer treatment in Germany. Dr. S.M. Shahidul Islam give thanks to Alo Bhubon Trust (Alo-BT) for organized such type of program and expect that they will do such programs in the future.

All the doctors and nurses diligently approached the seminar and they said they had benefited immensely which will be a tremendous effect on their life and the patient. In the near future, they want to join such a type of seminar again.

In service training for the Radiation Oncologists and Medical Physicists with German Expertise

South Asia Centre for Medical Physics and Cancer Research (SCMPCR) is constantly playing a crucial role in addressing issues that are overlooked or ignored by government and industry. To manage this huge growing demand of patients, SCMPCR is trying to create skilled manpower for the cancer treatment team by international experts since 2018. In a continuation of those activities SCMPCR along with Senior Experten Service (SES) and different hospitals were brought two senior experts Dr. Med. Udo Zimmermann (Senior Expert in Radiation Oncology) and Dr. Katharina Mair (Senior Expert in Medical Physics) from Germany for an on-site in-service training was held from 24th November 2019 -14th December 2019 in different hospitals. The main goals of this training was to deal with the design, harmonization and development of in-service training for Oncologists and Medical Physicists in Bangladesh, as well as an initiation of continuous implementation of this type of programmes at the institutional, national, regional and international levels. These activities can lead to a global network having the potential to significantly improve standards of care for millions of cancer patients worldwide include Bangaladesh .

We want to express our sincere gratitude and cordial thanks to Prof. Dr. Golam Abu Zakaria and Prof. Dr. Hasin Anupama Azhari of SCMPCR for arranging such improbable training. The training was absolutely superb and I genuinely enjoyed each and every moment of it.

This training was on-site training and the main advantage is it gives us the opportunity to work together and allow all the trainings and learnings to focus on the object and can discuss real and current example and also encourages greater team work, awareness and understanding each other's role where the foreign training is acquired by a few members of the department. This onsite training access to our own dosimetric tools, software and the instructors have the opportunity to tailor the course to focus on our equipment's and worksite.

We have shared our ways of planning and the expert has shared their experiences. In every case Dr. Katharina has discussed about some techniques to fulfill the principle object "maximum dose to the tumor and minimum dose to the normal tissue" and how to minimize the overlapping doses, minimize the hotspot in PT Department of Radiotherapy, NICRH, cold spot outside the PTV (normal tissue) and save the OAR.

I just want to share my feedback on my profession which I got from the well-presented training. I usually go to this type of events with an agitated feeling but this training was completely different and almost everyone had the same feedback like me. This proves just how powerful and influencing the training was. I was particularly impressed with the practical use of the material presented. This was exactly what I expected from a training and Utmost thanks to SCMPCR for giving us such a wonderful training.

Md. Ariful Islam,
Medical Physicist, NICRH, Dhaka

The first phase of the training on Radiation Oncology and Radiotherapy was held on 24 to 28 November 2019 at the department of Square Oncology and Radiotherapy Centre. The training was made up in the basis of the cooperation agreement between Square Hospital Ltd and SCMPCR. Dr Med Udo Zimmermann, Radiation Oncologist and Dr Katharina Mair, Medical Physicist were conducted the training. The aim of this training program was to share knowledge in the field of Radiation Oncology and Medical Physics in Bangladesh.

The training schedule was two folds which are mostly hands-on in the morning and lecture on slide presentation at the evening. The lecture was followed by hands-on. In hands-on session in Radiation Oncology, Dr Zimmermann showed and discussed the CT simulation and contouring strategy in details of Brain, Head & Neck, Thorax and Pelvis region. In his lecture he also showed the dose and radiotherapy techniques of non-malignant tumor and diseases. This is very new and not practiced in Bangladesh.

At the same time in Medical Physics group Dr Katharina shared her experience on planning techniques on Three-Dimensional Conformal Radiotherapy (3DCRT), Intensity Modulated Radiation Therapy (IMRT) and Volumetric Modulated Arc Therapy (VMAT). She showed Quality Control procedure of Linear Accelerator and CT simulation base on her institutional QC protocol. On 28 November the training was concluded at Square Hospitals Ltd.

Phase-2: The 2nd phase of the training on Advanced Radiotherapy Techniques was held at the Department of Radiotherapy, NICRH from 30th November to 5th December 2019. The training was arranged by the SCMPCR and co-organized by the Department of Radiotherapy, NICRH. NICRH offers an energetic and dynamic environment and staffed by well trained professionals dedicated to cancer patient management, education and research. This is only tertiary level center of the country engaged in multidisciplinary cancer patient management.

Everyday the training session was held in two sessions; one for Radiation Oncologists and others for Medical Physicists every day. Dr. Med. Udo Zimmermann had discussed with the Oncologists in the contouring lab. At the same time Senior Medical Physicist Dr. Katharina Mair sat with the participant Medical Physicist on TPS. After discussing with Dr. Katharina Mair, the physicist session was separated into two parts one for theoretical and others for practical. In theoretical part she discussed about different case of different tumors site with pros and cons and then go for practical session on TPS. According to the hospital clinical practice and most common case basis they distinguished the cases. For example, for head & neck (Nasopharynx, buccal mucosa), gynecology (Cervix & breast cancer), urogenital tract (prostate cancer), digestive tract (brain tumors, esophagus) and whole-body radiation (craniospinal) and start their training on treatment planning.

She also shared some new ways of field arrangements, gantry, collimator and couch angle and also some techniques for example Arc therapy. She had guided about 3DCRT and IMRT for other sites and patient cases also. In dosimetric session she practically showed some daily, monthly and annual QA.

In the last day of the training session the Oncologists were involved in contouring for different cases and the physicist group completed the treatment planning. The discussion about different techniques of radiotherapy and Quality Assurances (QA) between the oncologists and medical physicists with the two German experts has made the overall training very fruitful and advantageous. The Radiation Oncologists and Medical Physicists have attended this training programme. Both groups are very satisfied with the hands-on training and it made a very positive impact on their daily clinical practice.After this successful training program, a closing ceremony was arranged.

The whole programme was coordinated by the Retired Director of NICRH Prof (Dr.) Md. Moarraf Hossen and retired Head of the radiotherapy department Dr. Md. Mafizur Rahman and the guests distributed the certificates tp the participants.

Phase-3: The 3rd phase of the Training took place at the Department of Radiotherapy, Dhaka Medical College Hospital (DMCH) from 7th to 12th December 2019. The training was organized by the South Asia Centre for Medical Physics and Cancer Research (SCMPCR) and co-organized by the Department of Radiotherapy, DMCH. There is a MOU between the Department of Radiotherapy, DMCH and SCMPCR. Dhaka Medical College Hospital provides world-class treatment for cancer and related diseases in Bangladesh within the reach of common people. The training was designed for the radiation oncologists and medical physicists to provide skilled manpower in the field of cancer care for the patient benefit. All the participants were from this hospital and the trainers were from Germany. The advantage of this training was that it provides more benefit to the whole department than foreign training acquired by few members of the department. The hospital authority expressed their sincere gratitude to the Department of Medical Physics and Biomedical Engineering, Gono University to provide them two Treatment Planning Systems for the training and their cordial thanks to Prof. Dr. Golam Abu Zakaria and Prof. Dr. Hasin Anupama Azhari of SMPCR to arrange this training.

The training was planned in two sessions, one for the oncologists and one for the medical physicists everyday with different cases of different tumor sites. First Dr. Udo Zimmerman sat with the oncologists and completed the contouring of a particular case, then Dr. Katharina Mair sat with medical physicists to complete the planning for treatment. Both the oncologists and medical physicists discussed different approach about contouring and planning to find out the pros and cons of a particular method. The hospital physicists show their ways of planning and the experts have shared their experiences. Dr. Katharina have discussed about some techniques on how to minimize the overlapping doses for breast cases for three-dimensional conformal radiotherapy (3DCRT). She had guided about 3DCRT and IMRT for other sites and patient cases as well.

The discussion about different techniques of radiotherapy and Quality Assurances (QA) between the oncologists and medical physicists with the two German experts made the overall training very fruitful and advantageous. The total number of participants were about seventeen among whom Radiation Oncologists were about fourteen and three medical physicists. Both groups were very satisfied with the hands-on training and it made a very positive impact on our daily clinical practice now.

There was a closing ceremony where certificates were distributed among the participants and memento made of Bangladeshi handicrafts were presented to the distinguished guests. The whole programme in the radiotherapy department was coordinated by the then Head of the department of Radiotherapy of DMCH, Prof. Dr. Qazi Mushtaq Hussain.

SCMPCR authority is Very thankful to Dr. med. Udo Zimmermann and Dr. Katharina Mair and the hospital authority's and staffs for their support and cooperation to arrange this training and make this training fruitful and effective.

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

This event was already finalized and postponed to end of 2020 because of Covid-19 pandemic. The new dates will be announce soon

Venue: University of Colombo & NIC Maharagama, Sri Lanka

Acknowledgment — Organized by — Co-Organizers

Measurement of Correct CT Value: Experimental Comparison of Ultra-High Resolution CT and High Resolution CT by a Handmade Phantom

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ABSTRACT:

INTRODUCTION:Undershoot and overshoot sometimes expose adverse effects on the edge of the high difference Hounsfield Unit (HU) objects in the CT image. To evaluate small objects in the CT images thereon no alternative to high resolution. Even though high-frequency kernels provide a satisfactory resolution, undershoot and overshoot appears. CT value measurement cannot be performed correctly due to the change in sharpness on the edge of the soft and hard objects. This experiment has conducted using a handmade phantom. ***MATERIALS AND METHODS:*** A 0.25 mm detector size prominent Ultra-High Resolution CT (Aquilion Precision), a 0.50 mm detector size eminent High-Resolution CT (Aquilion Prime), and a handmade phantom were used in this experiment. Two Acrylonitrile Butadiene Styrene (ABS) plates, two aluminum plates, water, and contrast agent have been used in this phantom; where ABS plates were surrounded with the contrast agent, on the contrary, a set of aluminum plates were surrounded with air and another in the water. The two plates (ABS and Aluminum) moved away increasing the distance between the similar two plates, thus images were taken till enough information have been achieved, this action gradually continued with both sets of plates. ***RESULTS:*** High-frequency kernels provided excellent resolution, swift response, and high sloping, but excessive undershoot occurred after transcending the correct CT value. After some interval distance, the graph line continued with the correct CT value. Soft tissue kernels provided poor resolution, delayed response, low sloping, and the graph line needed additional distance to cross the correct CT value. Soft tissue kernels in Ultra-High Resolution CT (UHR-CT) allocated better spatial resolution and first cross the correct CT value compared with High-Resolution CT (HRCT). High-frequency kernels in UHR-CT not only displayed better spatial resolution but also showed low undershoot and graph line touched near to the correct CT value. ***CONCLUSION:*** UHR-CT provides better performance, correct CT value, and kernels do not create excessive edge enhancement compared to HRCT.

INTRODUCTION:

High-resolution computed tomography (HR-CT) images generally provide edge enhancedImages (Terakawa et al. 2009). Ultra-high resolution computed tomography (UHR-CT) improved spatial resolution (Motoyama 2018, Kakinuma et al. 2015). In computed tomography (CT) image quality is essential for high-quality diagnostics. Soon after the first commercial CT scanners had appeared, the need for standardized quality assurance (QA) tests arose (Goodenough 1977). Diagnostic image quality cannot be fully assessed without the knowledge of the anatomical area of interest and pathology to be searched for. Due to that, many different anatomical phantoms have been developed, such as cardiac, liver, lung, thorax phantoms, among others (DeWerd & Kissick, 2014),

The reconstruction kernel, also referred to as "filter" or "algorithm" by some CT vendors, is one of the most important parameters that affect the image quality. Generally speaking, there is a tradeoff between spatial resolution and noise for each kernel. A smoother kernel generates images with lower noise but with reduced spatial resolution. A sharper kernel generates images with higher spatial resolution, but increases the image noise. Generally, the kernel used for image quality improvement (Imagewisely.org 2019, Sieren et al. 2014, Jang et al. 2011, Völgyes et al. 2017, Fernandez et al. 2013, Solomon and Samei 2014). In some cases, artifacts play an essential role in CT image, but occasionally, it creates an adverse effect on image quality.In computed tomography (CT), the term artifact is applied to any systematic discrepancy between the CT numbers in the reconstructed image and the true attenuation coefficients of the object. CT images are inherently more prone to artifacts than conventional radiographs because the image is reconstructed from something on the order of a million independent detector measurements. The reconstruction technique assumes that all these measurements are consistent, so any error of measurement will usually reflect itself as an error in the reconstructed image (Barrett & Keat 2004). Image artifacts are caused by many things: the nature of the physics, suboptimal system design, limitations of current and new technologies, patient characteristics, and suboptimal or inappropriate use of the scanner (Hsieh 2009).

However, this article mainly focused on the accuracy of the measurement of CT values of small objects and highlighted the difference between high-resolution CT and ultra-highresolution CT over image quality.

MATERIALS AND METHODS:

Aquilion Precision is the world's first Ultra-high resolution CT (UHR-CT) capable of resolving anatomy as small as 150 microns with a nominal 0.25 mm slice width combined with a 1792 channel detector configuration that quadruples the diagnostic

Figure 1: Handmade phantom setting in the Aquilion Precision (UHR-CT)

Figure 2: The 0.18 mm diameter prominent radiographic film: All film diameter is the same size resulting every time two plate distance increase the same.

information available compared to standard resolution CT (Us.medical.canon 2019). Aquilion prime is provided 0.5 mm high-resolution images of a wide area with a 0.5 mm x 80-row (160 slices) detector and a helical scan of 0.35-second rotation (Us.medical.canon 2019). In the experiment, we used Aquilion Precision, Aquilion prime, and a handmade phantom.This phantom (Fig.1) consists of one thin plastic box in which It consists of three parts that can be changed. Those parts are respectively two acrylonitrile butadiene styrene (ABS) plates surrounded with the Iohexol contrast agent (ABS-Contrast), two aluminum plates surrounded with air (Aluminum-Air), and the other surrounded by water (Aluminum-Water).The 0.18 mm diameter prominent radiographic film (Fig. 2) is used for changing the distance continuously between two plates.In the experiment, the same phantom with different types was scanned many times with the same scanning parameters. The peak voltages used were 120 kVp with S&V scan method and tube current used were 200 mA with the speed of one rotation per second.We used ImageJ software for analyzing the DICOM data.

Phantom Design and Setup

Gradually,this phantom can change the minimum distance. Phantom constructed respectively by one thin plastic box, two aluminum plate, two ABS plate, water, and contrast agent.Two aluminum plates attached by two double-clips (Fig.3) andthe diameter of both aluminum plate has measured by a micrometer.This two-aluminum plate kept in the center of the box as a fixed angle (Fig.4) and took the image by CT machine.Plates are kept on 30 degrees in a fixed angle because of avoiding error affecting by pixel division.For increase the distance between two plates, radiographic films (Fig.1) are used, resulting small gap increased (Fig.4) and again the diameter of both aluminum plate has measured by a micrometer.

The small gap increased, measure with a micrometer and taking the image by CT machine as a fixed angle respectively continues in the same way.The next two parts (ABS plates surrounded by the contrast agent, aluminum plates surrounded with water) are finishing Imitating the same process.

CT Scanner and Reconstruction Kernels

Two different types of CT machines have used in this examination. Table 1 represents UHR-CT and HRCT scan and reconstruction parameters. One of the essential image quality features is CT number linearity. Computed tomography images are the graphical representation of the linear x-ray attenuation coefficient (μ) of an object – calculated tomography numbers measured in Hounsfield units (HU). Hounsfield units (HU) varies on material density, but our handmade phantom materials are respectively air, water, IOPAQUE injection contrast agent and aluminum where HU for water is 0, HU for air is −1000, HU for IOPAQUE injection contrast agent is 550 and HU for aluminum is 2500.

Filtered back projection (FBP), iterative reconstruction (IR), and highbred iterative reconstruction are the three most common reconstruction methods. We used only filtered back projection

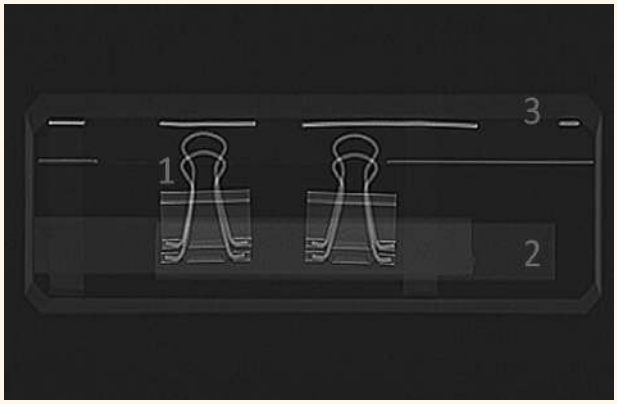

Figure 3: 1 - a double-clips. 2 - an Aluminium plate, and 3 - a Plastic box.

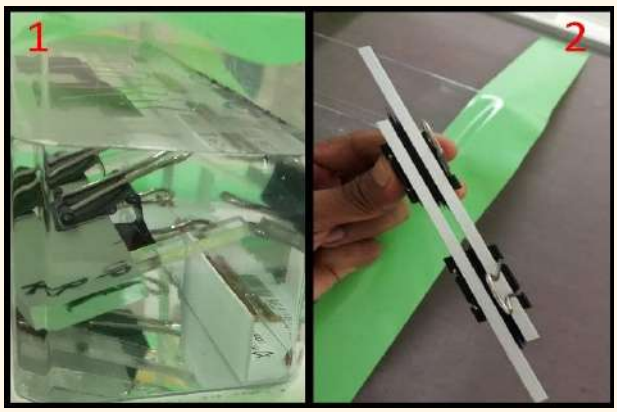

Figure 4: Angle setup is shown in the NO 1 image. Distance increasing using radiological film are shown In NO 2 Image.

Table 1. Scan and Reconstruction Parameters

Tube voltage	120 kV
Tube current	200 mA
Rotation speed	1.00 s
Data collection diameter	320 mm
Display field of view(FOV)	50, 100, 200 mm
No. axial slices	04
Setting slice thickness	1.0 mm
HRCT matrix size	512 × 512
UHR-CT matrix size	1024 × 1024
Scan method	Axial scan

Table 2. Reconstruction Kernels

FC13	Smooth, for soft tissue
FC30	Sharp, for bone
FC52	Sharp, for lung
FC80	Sharp, for bone

(FBP) with four kernels this time (Fig. 2 depicted a summary of the kernels).

In HRCT all of the measurements were performing in the same patient-table positions without modifying anything in the setup except for the tube voltages, which yielded one scan for every tube voltage. Therefore, at a given tube voltage, every reconstruction used the same raw data. Only the phantom distance is changing gradually. In UHR-CT all scan parameter is similar compared with HRCT except of scan mode and matrix size. UHR-CT has three scan mode; these are respectively NR, HR, and SHR. We select HR mode

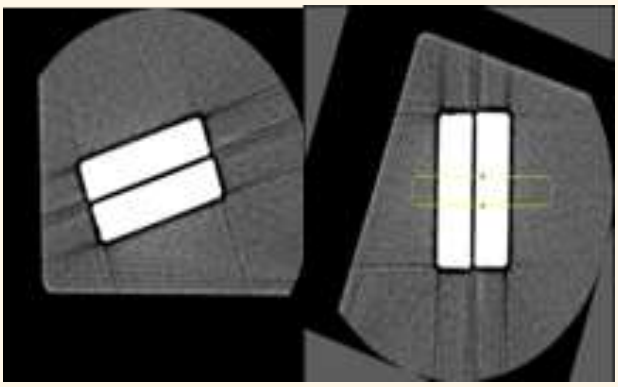

Figure 5: In this image changed Windows and Level (W&L); the reason of interest (ROI) picked on both plates.

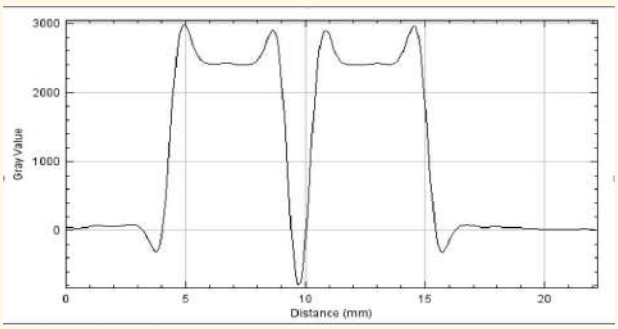

Figure 6: This image shows the plot profile at the same distance between two plates.

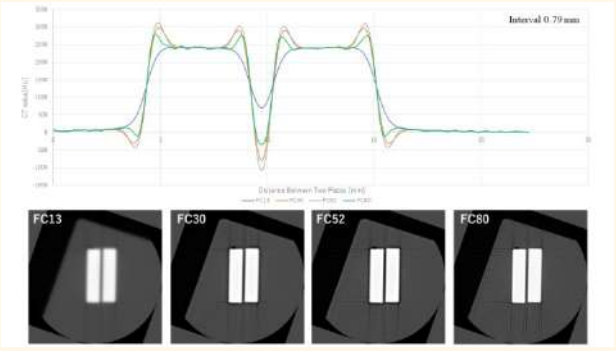

Figure 7: This image shows the plot profile at the same distance between two plates.

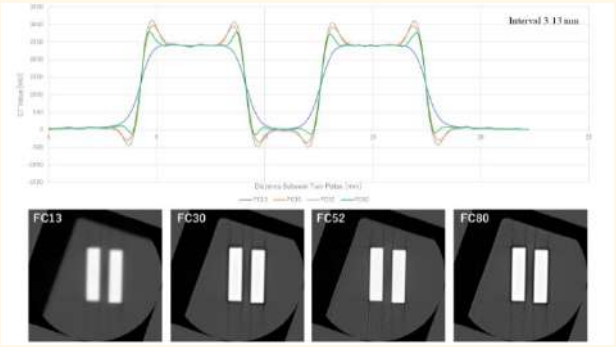

Figure 8: This image shows the plot profile at the same distance between two plates.

in our experiment because of this phantom do not depends on Z-axis resolution and kernels only affect the X-Y axis. HR mode reduces noise compare with SHR mode, and NR mode resolution is similar to HRCT.

Data Collection and Analysis

DICOM data collected from two CT scanner(UHR-CT and HRCT) and data calculations accomplished by ImageJ software following the same approach.The data opened in ImageJ software at a specific distance between the two plates of Aluminum-Air and selected the slice number after that transformed the angle. After we changed Windows and Level (W&L); the reason of interest (ROI) picked on both plates which demonstrated in Fig. 05.

Later on, we created the plot profile (Fig. 06) for various FOV (FOV 50, FOV 100, FOV 200), and the excel data has collected. Note that, for the same distance and the same FOV; Four kernels used for each FOV resulting created four different excel data. Above the same procedure, with the increase of distance between the two plates, the graphs created based on specific FOV, specific kernels, and various interval distance.

This method repeatedly followed for the convenience of data representation. In ABS-Contrast and Aluminum-Water plates data calculation; Air bubble avoided during the selection of ROI. In ABS-Contrast and Aluminum-Water plates data calculation; Air bubbles avoided during the contour of ROI, and their data calculations accomplished according to the Aluminum-Air.

RESULTS:

CT Value Measurement

Various Kernels

All kernels provide Intermediate correct CT value when the interval is large between two plates, but for thinner range, Karnes did not provide Intermediate correct CT value. Fig. 8 shows that all kernels (Both soft tissue and high-frequency emphasis kernels) provide correct CT value because intermediate CT value touches the water CT value. Albeit water Hounsfield unit is 0, but in ImageJ, we set ROI in the background water area, which shows the water average CT value is 25. Soft tissue kernel like FC13 doesn't have enough spatial resolution compared with high-frequency emphasis kernels.

High-frequency emphasis kernels provide that intermediate CT value lowers than correct CT value (Fig. 7 shows that FC30, FC52 and FC80 are providing lowest CT value more than water) resulting in high difference Hounsfield unit (HU) small objects can be defined easily in FC30, FC52 and in FC80 kernels. These undershoot graphs are also responsible for the black image between two plates. Fig. 9 shows that soft tissue kernel gradually approached the correct CT value when the interval increased.

High-frequency emphasis kernels have a superior spatial resolution compare with the soft tissue kernels, which quickly reduced CT value and crossover the correct CT value, but the additional downfall occurs before the correct CT value approach.

UHR-CT and HRCT

This fig.10 shows that the spatial resulationof UHR-CT is better than HRCT. UHR-CT value quickly approaches the correct CT value for all kernels resulting in small object detection is fruitful. Undershoot occurs in High-frequency emphasis kernels for both CT machine, but UHR-CT provides small understood; as a result, the deviation from correct CT value is low, except for FC80.

FC80 quickly crosses the correct CT value and shows a high deviation from the correct CT value. Compare with FC80 in URH-CT; FC30 gradually passes the correct CT value but provide very small undershoot. FC30 stay the long distance with correct CT value, and accurate CT value measurement performed in a wide range.

CT Value Difference

Aluminum-Water kernels show the CT value which near to the correct CT value compare with Aluminum-Air. In Aluminum-Air kernels graph represent the high deviation from correct CT value at undershoot part because of Aluminum-Air CT difference is high compared with Aluminum-Water.Which depicted in Fig. 11.

Acrylonitrile butadiene styrene(ABS) plates CT values are much smaller compared with intermediate substance (contrast agent). Fig. 12 recount different kernels CT value in HRCT and UHR-CT. This time, the contrast agent surrounds ABS plates; as a result, reversed things occurred. The graphs went upward and created overshoot. It proves that when small object CT value is high compared with surrounding substance same things happened when small object CT value is low compared with surrounding objects.

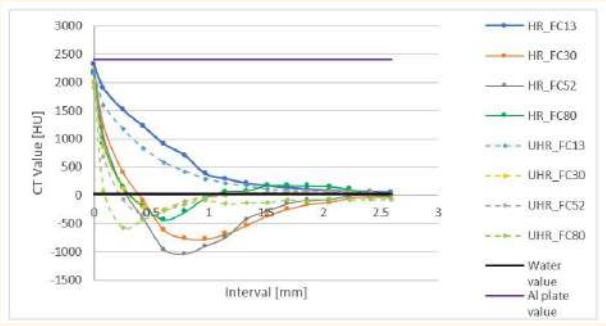

Figure 9: All kernels provide Intermediate correct CT value when the interval is large between two plates, but for thinner range, Karnes did not provide Intermediate correct CT value.

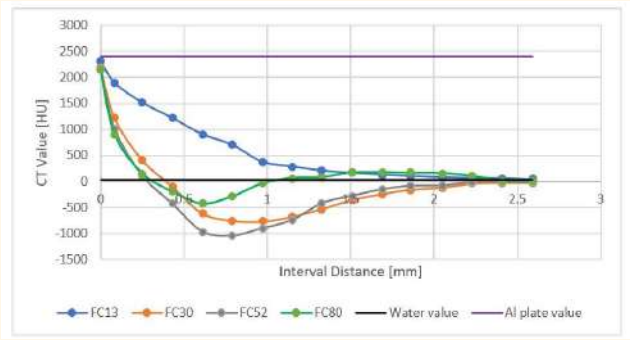

Figure 10: Shows that the spatial resulation of UHR-CT is better than HRCT.

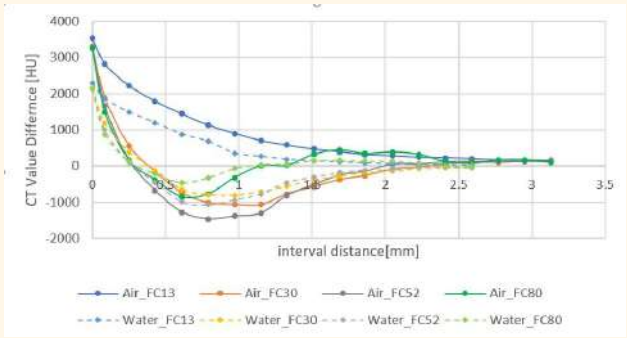

Figure 11: Aluminum-Water kernels show the CT value which near to the correct CT value compare with Aluminum-Air.

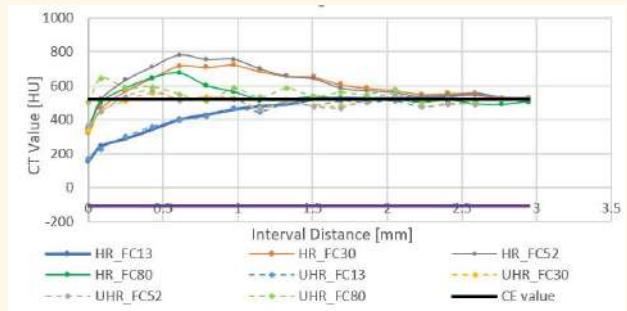

Figure 12: Shows recount different kernels CT value in HRCT and UHR-CT. This time, the contrast agent surrounds ABS plates; as a result, reversed things occurred.

Display FOV Change

Along with the changes in the display field of view (FOV) also change the pixel size. Pixel size does not affect on the resolution,

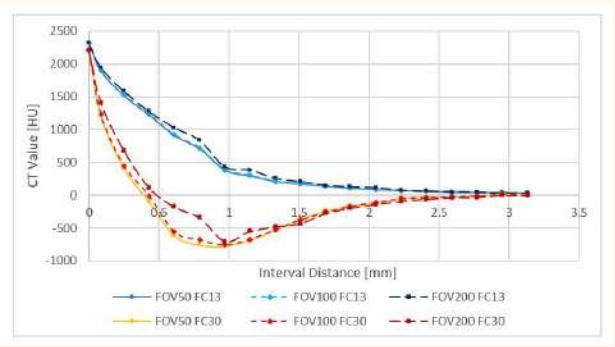

Figure 13: Shows demonstrated the relation between FC13 and FC30. For reducing complication of the graph and due to displaying

but when the pixel size is too more prominent compared with CT performance than resolution decrease. FC13 is a kernel for soft tissue, and FC30 is a representative of high-frequency emphasis kernels. Fig.13 demonstrated the relation between FC13 and FC30. For reducing complication of the graph and due to displaying the same result has avoided others kernel result.

At the undershoot part FOV 200 mm curve of the high-frequency emphasis kernels are slightly different from the other FOVs. Pixel size is not sufficient for sampling interval on FOV 200 mm. Average CT value is used to make the lowest part of the graph, and undershoot CT value increased.

DISCUSSION:

CT doesn't have enough spatial resolution. Correspondingly it seems like that small object measurement is difficult in CT machine, but using high-frequency emphasis kernel sometimes better result obtainable. High-frequency emphasis kernel increases the objects CT value near the correct CT value, which originates undershoot and overshoot. Overestimate image not provide correct CT value but provide an excellent spatial resolution, which helpful for small objects detection.

For achieving better image, it is essential for the first deviation towards to touch correct CT value and then continues with the correct CT value. UHR-CT not only improved spatial resolution but also used kernels tend to occur low undershoot. In HRCT, FC80 provides better images among those four types of the kernel, and in UHR-CT, FC30 is better.

CT value of aluminum, water, and air have a widespread difference. Undershoot and overshoot occurred at the edge objects. We already know that the high CT value difference between two objects provide high undershoot and overshoot. Consequently, in a clinical situation like coronary angiograms, it is not possible to measure correct CT value, but CT value difference increases at calcification in the lung area accordingly undershoot and overshoot appears. It is beneficial for detecting small objects but not useful in identifying correct CT value measurement.

When the CT value of the small object is higher than the surrounding substance, CT value increases excessively because of the overshoot repeatedly overlap, and the CT value of the small object is lower than the surrounding material, CT value decreases because of the undershoot repeatedly overlap. Due to using high-frequency emphasis kernels, calcifications in the lung area, and plaque in the blood vessel created by the contrast agent, etcetera are considered to indicate excessive CT value response.

In this study, we used the same data correction diameter (320.00 mm), and only display FOV changes, resulting in undershoot and overshoot deviation almost not change. Undershoot and overshoot depend on plate interval.

CONCLUSIONS:

To measure the correct CT values of small objects; it is essential to use not only high spatial resolution but also kernels (like FC30 in UHRCT) except excessive edge enhancement. This handmade phantom can find the ideal kernel for measuring correct CT value from the image. Since pixel numbers not changed, It is therefore not possible to conclude that undershoot and overshoot depends on the pixel number.

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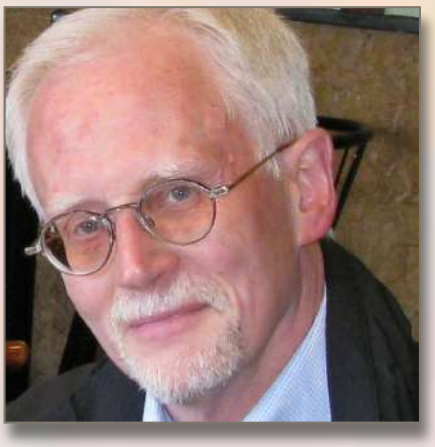
Developing Clinical Practice in Medical Radiotherapy Physics



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Quality and success in radiation therapy is driven by new technical developments and methods which we describe and celebrate in journals like this newsletter. Medical physicists have the responsibility to keep pace with these developments and therefore require specialized basic education provided by specialized universities like Gono Bishwabidyalay in Bangladesh and life-long continuing education as offered by SCMPCR. On top of solid basic knowledge medical physicists must be proficient not only in operating the technology but also in practically assessing and then performing safe and efficient procedures. This quality assurance must be adjusted to the specific configuration of equipment and the specific constraints of every hospital and then to the specific needs of each individual patient. Physics QA is responsible for both the implementation of the highly complex technology of radiation therapy into local clinical practice and its subsequent maintenance. Both stages of QA require extensive practical experience. Physicists missing clinical experience are often insecure in taking the responsibility to implement new or even well-known techniques and can therefore be a hindrance in performing optimal radiotherapy. For this reason practical education is a key topic in the curricula for education of medical physicists as recommended by IAEA [1,2,3] and the scope of medical physics professional responsibilities as described by AAPM [4].

Practical training in medical physics and QA must be provided by radiotherapy departments in hospitals since such practical skills cannot be instructed at universities. This must take place using radiation medicine equipment like medical accelerators and diagnostic equipment which is only present at hospitals and not at universities. Training must deal with tasks given by real patient issues. However, training at hospitals is difficult to organize since hospital administrations and radiotherapy departments are often reluctant towards dedicating time, money and staff is not immediately profitable undertakings like education of additional junior medical physicists. Furthermore, achieving education in nationwide reliable quality requires guidelines and supervision.

For these purposes, IAEA Report TCS-37 "Clinical Training of Medical Physicists Specializing in Radiation Oncology " [2] describes a comprehensive program for practical education of radiotherapy physicists. Such programs are usually designed and approved by professional boards and backed by national regulations which then often define educational standards for professional accreditation. In countries where no such regulations are in place it is recommendable that the professionals themselves organize the necessary education program. To do so, professionals can take an active role in preparing future governmental regulations. They can use guidelines by IAEA and other professional societies to implement professional bodies and curricula on their own behalf. The following suggestions describe how medical physicists together with radiation oncologists can develop measures and structures of a program for practical training which can step by step implement the requirements as recommended by IAEA [5] and IOMP [6].

Creating national advisory boards

IAEA's Training Course 37 [2] lists a number of different bodies and persons with different functions in a clinical educational program. Some of these are actually needed only at a later stage to supervise the implementation of regulations. These can therefore be installed later. However it may be helpful to keep these functions in mind in order to more easily install them when their time has come. Some of these professional bodies however are helpful in organizing the program and should be implemented as soon as possible.

Professional body:

An important body which should be implemented as soon as possible is termed the professional body by IAEA. Its function is to provide important coordination in the development of the further program. Before implementation of legal regulations, the professional body should be authorized by its member groups to monitor and advise the educational activities.

IAEA' definition: The professional body is responsible for setting the professional standards required to define competency and providing professional support for the program. It would normally have overall responsibility for the assessment processes. [2]

In other words, the professional body defines and formulates the professional requirements in radiation medicine practice, and consequently also the education topics and issues. It should be composed of members of all professional groups and stakeholders pertaining to radiation therapy and should consist of persons with sufficient professional knowledge. These are specifically professional societies in Medical Physics and Radiation Oncology together with the universities and national authorities specialized in radiation safety and regulations. Early tasks for this body are the identification of hospitals and trainers willing to participate in the training and making the program visible to candidate trainees.

National program Coordinator

A helpful institution is a permanent spokesman of the professional body overseeing the execution of education program and serving as liaison to the physicists in education and their supervisors. IAEA recommends the nomination of a national program coordinator. Such a person could also be helpful in the development phase of the education program.

IAEA' definition: The national program coordinator is responsible for coordination of the project and liaises with residents and their clinical supervisors to ensure that the quality of training is appropriate and that residents develop adequate skills and professional attitudes. [2]

Support Group, Clinical Supervisors

Two functions which should be installed as soon as possible are what IAEA calls the support group and the clinical supervisors. The members of this group would be selected by the professional body which identifies and approves the qualification of clinical supervisors and mentors, and assigns respective tasks.

IAEA' definition: The support group is made up of individuals who agree to assist with Resident training. The support group may include radiation oncologists, radiation oncology medical physicists and personnel from educational institutions. Ideally, at least one person, external to the country, is also a member of the support group. [2]

The support group and clinical supervisors at each participating hospital could be assembled from the medical physicists who are already working in radiation therapy. A number of theses physicists will probably already have trained junior physicists and could participate in the program. This is the group actively training junior physicists. At each training hospital, a clinical supervisor monitors or actively conducts the practical training.

IAEA' definition: The clinical supervisor is a suitably qualified and experienced medical physicist specialising in radiation oncology who is working in the same department as the resident. He or she has a pivotal role in ensuring the success of the clinical training of a resident. [1]

Where no regulations exist which legally require the participation of hospitals in the training program, the professional body together with the support group should reach agreements with hospitals and radiotherapy departments to accept a pre-defined number of trainee physicists.

Developing training step by step

In situations where radiotherapy is currently only beginning to grow it may be sufficient to start by training a small number of medical physicists. This number can be adjusted to the number of newly planned institutions. One could, e.g., begin with 2-3 junior physicists per year who are trained for the most basic practical tasks in their first year. After this year, the juniors could start working at new radiotherapy installations under supervision of their instructors. In the following years they could obtain further instruction by their trainers and could on the other hand provide initial training to younger physicists. This process could be continued until the full curriculum of practical training is completed. In such a scheme it is important to provide comprehensive documentation of all training tasks in order to furnish proof of competence and to later apply for national or international accreditation. A provisional professional body and support group as described above could monitor the training in order to maintain the needed quality.

IAEA suggested institutions which can be installed at a later stage

At a later stage, when legal regulations are in place, their fulfilment could be monitored by a national steering committee and a national program coordinator:

IAEA' definition: The national steering committee is comprised of the professional body and representatives from relevant interest groups and stake holders. The national steering committee is responsible for maintaining standards in the program by ensuring that guidelines for participation are strictly followed by Departments and Residents. It deals with complaints and appeals. It supervises the national program coordinator. [2]

IAEA also names a number of other program functions which are helpful on the longer run but are probably not essential in the build-up phase:

IAEA' definitions:

- The **mentor** may be the clinical supervisor or other person or a support group may serve a mentorship role. It is important that the "mentor" is someone that the resident chooses to perform this role. The mentor may provide advice on professional and personal issues and particularly can help in establishing a work – life balance. For more involved personal issues however the resident should be referred to the hospital counsellor or other suitable professionals.
- The **external coordinator** monitors the progress of Residents and the program in general. He/she works closely with the national program coordinator and national steering committee to ensure the smooth operation and success of the program.
- The **external reviewers** monitor the progress of individual Residents and review their work plan or items of assessment. [2].

Conclusions

In summary, practical training is a key part of medical physics education and must be conducted by the active professionals. This should be organized and supported by professional bodies and national regulations. Where such support is missing it is well possible to organize training programs on one's own behalf.

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Medical Physics Education and Regulations: Indian Scenario

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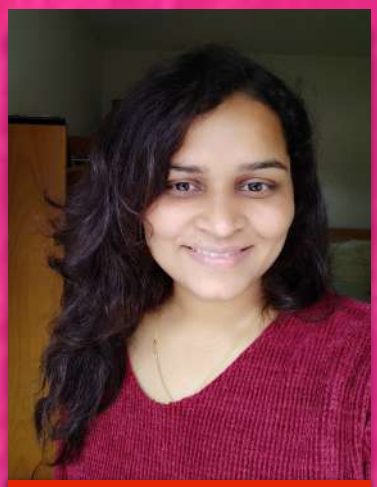
Medical physics is a bridge between physics and medical science. It is thriving as dynamic stream of science, getting recognized very well in medical community and public masses worldwide. India is also not an exception to this; medical physics has strong history of 60 years in India. Today medical physics education, profession and related regulations are quite well established in India. Sixty years back with the application of radiation in health care, need of qualified medical physicist to take care of the radiation safety dosimetry and treatment planning was felt and Bhabha Atomic Research Center (BARC) with support from World Health Organization (WHO) started one-year postgraduate Diploma in Radiological Physics since 1960. Till 1982 this was the only training program with capacity of 20 trainees available to get Qualified Medical Physicists.

To cater the increasing demand of Medical Physicist [mandatory requirement from competent authority – Atomic Energy Regulatory Board (AERB) to have Radiation Safety Officer (RSO) for each Institution where radiation generating equipments and radioisotopes are used in clinical practice] – Anna University in Collaboration with Adyar Cancer institute started 2 years MSc Medical Physics program in 1982. Today there are more than 20 universities who are offering masters in Medical Physics program. In India at present there are two pathways to become Clinically Qualified Medical Physicist [CQMP]:

1. One year post M.Sc. [Physics] Diploma in Radiological Physics [Dip. R.P] from Homi Bhabha National Institute (HBNI), BARC, Mumbai with 1-year medical residency program in a moderately equipped from AERB recognized institute is mandatory.
2. Two years post graduate degree course in Medical Physics after graduation in science with physics with 1-year medical residency program in a moderately equipped from AERB recognized institute is mandatory.

Once qualified as a medical physicist one can go for radiation safety officer (RSO) certification. As per AERB rules every institution with radiation generating equipment or facilities should have one RSO to get license to open and run the institution. So without RSO certification a medical physicist can work as clinical medical physicist but cannot be appointed as RSO of the institution. RSO certification is consisting of national level written examination followed by viva-voice examination; qualifying both of these parts of certification allow one to have RSO certification. Other important medical regulatory bodies like Medical council of India (MCI) recognize this certification throughout the country and this also ensure the uniformity of regulation everywhere in India.

Various steps are taken for improving quality of medical physics education and training from time to time. This is particularly very important in the era of ultra-tech medical imaging and therapeutic equipments with highly advanced imaging and therapeutic techniques. To meet this important requirement, the Association of Medical Physicists of India (AMPI) constituted its autonomous scientific/educational wing, the College of Medical Physics of India (CMPI), to initiate the evaluation and certification program for the qualified medical physicists. In addition, the college has also been entrusted to formulate the policy of accreditation of education and training center's in the country. Trial certification program was successfully conducted by CMPI in 2010 where 11 candidates participated in written and oral examinations and 10 of them have been declared successful. The



Ms. Rajni Verma

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CMPI certification is now conducted as a regular program every year. As of today this certification is voluntary but in near future this may be seen as an essential qualification to ensure quality services. Regulations are very important and more so when the safety of human life is involved. To ensure radiation safety in country AERB is the responsible authority. AERB has many roles in regulation, one of which is creating Safety Code (SC) and Guides for radiation application in different areas like medicine, industrial, energy, research. In medicine there are separate SC and guides for radiation therapy, diagnosis

Safety specifications for radioactive sources, radiation therapy equipment and protective devices

This is related to radiation safety aspect of source type, equipment design, source housing, interlocks, radiation level at various positions, output of equipment and related parameters with respect to the external beam radiotherapy equipment and brachytherapy equipment separately and specifically.

Radiation therapy installations

This subject is related to the guideline related to radiation therapy facility design regulations and includes details on Siting of the Installation, Layout of the Installation, Doors and Passages, Shielding, Openings and Discontinuities, Safety Interlocks and Warning Lights, Zone Monitor, Patient Monitoring, Radiation Symbol and Conventional Safety.

Operational safety

This subject has guideline about the details of calibration of equipment's, radiation monitoring on personnel level of area level, source transfer and exchange requirements.

Quality assurance

This subject is related to complete quality assurance of radiotherapy center including safety aspect, equipment performance, quality assurance protocols and its periodic reporting to AERB.

Patient protection

This subject is related to patient protection during radiotherapy with guideline related to periodic quality assurance, patient treatment record maintenance, Misadministration of doses and it is reporting to AERB.

Management of radiation emergency

This subject deals with the guidelines to create radiation emergency action plan before starting the patient treatment, Identifying emergencies, responsibilities of various personnel during radiation emergencies and reporting to AERB.

Radiation protection programme

This subject is entirely focused on role of RSO in radiotherapy department. It includes details related to qualification of RSO i.e medical physicist with RSO certification from AERB, required experience and his role in radiation safety and emergency management.

Personnel requirements and responsibilities

This subject is about the guidelines related to the minimum operating staff (oncologist, medical physicist and technologist) requirements of radiation therapy department, their qualification, experience and corresponding responsibilities. For example in case of medical physicist every radiation therapy center should have minimum of one medical physicist for up to 500 patients treated annually and additional is required in ratio of 1 per 500 patients treated annually and one RSO. In the near future with revised SC it is expected that medical physicist requirement will also depend upon the complexity of treatment technology and modalities available in the center.

Regulatory controls

This subject is related to regulatory controls of AERB. It mainly states the regulation about the license, type approval certification for vendors, various approvals required to build radiotherapy center or selling radiotherapy equipment in India, most importantly Inspections and penalties if guidelines related are not followed which may harsh as closing the center or imprisonment.

So basically one cannot run a radiotherapy center without a medical physicist. Role of the medical physicist as a RSO is of most importance and essential in radiotherapy department or center. The communication between AERB and radiotherapy center is basically lead by RSO or medical physicist with help of e-Licensing of Radiation Applications (e-LORA) web portal.

e-LORA is a web-based information and Communication technology application establishing direct communication channel between AERB and its stakeholders for exchange of information and communication transaction for delivering its regulatory services as well as for achieving higher efficiency, reliability and transparency in dealings. All the radiation therapy centers have to register on AERB's e-LORA web portal with all information related to equipment's, staff, operational updates and radiation safety details. Failing any of safety code guidelines can leads to heavy penalties, closing of the center and even imprisonment in some cases.

Medical physics as a profession is well structured in India but still there is a huge scope for improvement at education, training and professional level. Concept of specialization of medical physicist in various sub categories of radiation therapy, radio-diagnosis and nuclear medicine for regular operational procedures are yet to be recognized in India except in radiotherapy. Even opportunity of higher education like doctorates (PhD's) and research are available but not sufficient to the present requirement and demand. However as development of every science and profession take time to establish and recognized, we are looking forward to strong medical physicist and medical physics in near future.

Experience of attending the IMPCB Final Part Examination and The Sixth International Conference of Radiation Medicine (ICRM2020)

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It has been a great experience attending the sixth International Conference of Radiation Medicine (ICRM2020) organized by King Faisal Specialist Hospital & Research Centre (KFSH&RC) in collaboration with International Atomic Energy Agency (IAEA), Al-Faisal University, the Saudi Society of Medical Radiologic Technology (SSMRT) and with leading national and international organizations and professional societies. This event was held in Saudi Arabia from 9 to 13 of February 2020. I participated the conference to present my e-Poster presenter on the title of "Elekta Synergy 6 MV Accelerator Modeling and Dosimetry with BEAMnrc and DOSXYZnrc Monte Carlo Simulation Code and Validation with Measurement". It was held on 10th of February 2020 from 1.25 pm -1.30 pm.

Since I have earned 30 CME Hours from Saudi Commission for Health Specialties (SCHM) I was awarded the registration fee as waved. During this visit I had a great opportunity to chat with IOMP president Prof. Dr. Madan Rehani informally about contemporary issues and reactivation of Bangladesh Medical Physics Society (BMPS). I also met Dr. Belal Moftah who is the Chairman of the ICRM2020 organizing committee and I have invited Dr. Belal Moftah to join our upcoming AOCMP2021 event which will be held in Cox's Bazar, Bangladesh in 2021. When I met president of Saudi Medical Physics Society (SMPS) and General Secretary of Egyptian Association for Medical Physics (EAMP) I proposed a joint collaborative work and invited them to join AOCMP 2021.

I would like to express my heart-felt thanks to people who have made this conference possible and those who have shared their experiences during that one exciting week in Saudi Arabia. Specially I am thankful to Mr. Md. Abdullh Al Kafi who is a Medical Physicist from King Faisal Specialist Hospital & Research Centre (KFSH&RC) for taking us around the Riyadh City.

The first day of the conference I sat the International Medical Physics Certification Board (IMPCB) oral examination at the Clinical Simulation Centre of the, Alfaisal University. I am happy to share the good news that I have passed the IMPCB examination and I am the first Medical Physicist from Bangladesh certified as Qualified Medical Physicist (QMP) to practice the specialty of "Radiation Oncology Medical Physics".

Bangladesh Breast Cancer Conference BBCC (28 - 30 November 2019 in Dhaka) – Inspirational Event of 2019 in South Asia

Julie Chessell – Warrior Momma Canada

Kind words can be short and easy to speak, but their echoes are truly endless. – Mother Theresa

Global health disparities and the ability to access quality medical treatment remains a challenge in universal conversations. First world countries often take for granted the notion that not all preventative medicine is readily available for many nations. This inequality lends itself to collaboration between multiple parties that share a commonality to invest in all mankind.

Coming from a country that promotes non fee for service health care, many times people take their health for granted. This can lend a view of disappointment and despair, when diagnosis and resources are delayed for any reason and by the fear that ensures them. This was ever more prevalent in my experience as an acute care practitioner and the subsequent role reversal as a parent navigating a system that I expected to move at lightning speed and ultimately cure my son's cancer. We fell into that rabbit hole or notion of, Why us? How can we acquire all measures in order to save our son's life? Ultimately our story was one of joy and survivor ship, and for this we are eternally grateful. This new found gift of life has propelled our family into a shift in mindset that has allowed us to change lives. Our vision and passion have now become one of being a voice for global collaboration within the medical community. This is where Warrior Momma was born. This platform allows us to encourage and inspire women, men and families about determination and resilience in the face of uncertainty.

After a brief chance encounter at a conference in May 2019 at Harvard University in Boston Massachusetts, I had the esteemed pleasure to meet the incredible Dr. Golam Abu Zakaria. With both of us speaking upon different platforms at a Global Health Catalyst Summit, we remained in contact and ultimately this formed a friendship and an invitation to speak at a Breast Cancer conference in Dhaka, Bangladesh. This incredible conference format is dedicated to catalyzing high impact international collaborations and initiatives to eliminate breast cancer within the Bangladesh population.

Bi-yearly, the BBCC conference brings together the greatest researching minds, medical professionals, politicians, technology pioneers, international advocates and most importantly a combined vision to concentrate all efforts to treat breast cancer in South Asia.

Continued correspondence began for many months preceding the conference dates. I was continually greeted with warm and welcoming emails from the scientific committee and the conference organizers. Information was provided to ensure the Visa process was understood and accessible to obtain once arriving at the airport. Travel and accommodations were provided and the program committee were incredibly flexible with the schedules of the seekers presenting

From the moment I arrived in Dhaka, I felt the warmth of the people I encountered and the gratefulness to have traveled from Canada. I was greeted by a hotel representative and treated to a history lesson and tour of the true sites of Dhaka that was not to be forgotten. Upon arrival at the hotel, Pan Pacific Sonargaon, my every need was met and exceeded my expectations. A smile on everyone's face made my stay second to none have experienced before.

Having been in many countries and speaking at many conferences in the past, at times the process to submit information, registration and abstracts can be tedious and a lengthy process. The BBCC formatted their technology to allow keynote speakers like myself to put forth our CV and presentation in such a manner that was trouble free and uncomplicated. This is a very welcoming feature.

Upon arriving at the registration area, I was greeted by an incredible committee of people that handed me a very attractive shoulder bag, program booklet and many other surprises that were to be utilized throughout the conference. One measure that struck me right at the beginning of the conference is that participants took the time to call by name right off the bat. This was very welcoming and conveyed that the conference committee took interest in getting to know me and that continued through the 2 day events.

Since I was the first speaker at this revolutionary event, I was instructed to visit the media and computer experts in order to facilitate my presentation being coordinated with the multiple screens. Having provided these talented groups with my presentation on a flash drive, my USB production was quickly formatted to the appropriate media necessary to have a flawless speech. When an international motivational speaker attends a conference such as myself, this process is always worrisome as the media presentation and slides provided add to the lecture. If this area has difficulty, it can have a great effect on the overall message that the delegate is attempting to convey.

The conference venue was transformed from an ordinary space into a magical place that inspired all that attended. One option that was presented to myself was the ability to sit at the front of the conference. The seating that was provided was a grand and comfortable chair as these were reserved for

important lecturers and parliamentarians.

Once session that was truly inspiring was to see the amount of state heads and government officials that took part in a special session. It was so important to visualize that the government is listening and taking special interest in all presentations, and in turn this allows information to be brought back to parliamentarians that make decisions for the people in Bangladesh and healthcare. This was a welcoming session that I have spoken about too many other conference organizing committees. It shows that all levels of patrons regardless of background can have a common goal and work together towards stamping out breast cancer in Bangladesh. This edition reunited politicians, teachers, science communicators and researchers to discuss culture, science communications and overall health of women affected by breast cancer. The organization promoted work shopping and networking to lead discussions around cultural differences, science communication processes such as impact and evaluation and most importantly impact to all women involved with the diagnosis of breast cancer.

Attendees from around the globe had the opportunity to talk about the relationships between science and education, public policy and science appropriation and ways to reach the public audience. This was prevalent in my presentation that focused on the mindset of the cancer patient and how not only does science play an integral role to healing, but also the minister and overall well being of the women being treated to forget about this facet is doing a great disservice to all women who are diagnosed with breast cancer. I was greatly touched that leaders in the breast cancer world referenced my knowledge and sated what they would like to integrate my practice and the teachings into their patients' care. This made for in depth panel discussions and motivational meetings in the form of treatment, not only in Bangladesh, but for multiple women around the world.

Informally, the symposium was incredibly well received and conceived to be a vastly knowledgeable and stimulating event. Academics and professionals were brought together to discuss the vision of breast cancer and future considerations and direction to reach a common goal to facilitate the treatment of cancer. At a time when science is perceived to be underwhelming and facing severe challenges, this was an important gathering to be concerned about the future viability of the breast cancer stakeholders in the mainstream population. This conference provided improved scientific knowledge, tools and public health promotion about current challenges and technologies with the Bangladesh culture.

The vast topics presented in each plenary session was secondary to none and allowed for attendees to further their goal of eliminating breast cancer. International speakers from all over the world were invited to present their research to promote health and to come together to share knowledge. Whether it was a panel discussion on drug and radiation therapy or surgical techniques, all brilliant minds came together for one common goal. Themes and subject matter were carefully thought out and explored. Networking between speakers was highly encouraged and this was facilitated at a president's lunch and seating arrangements during the event. Presenters were motivated to connect with others in order to collaborate their research or simply to further contact for years to come. This is what most speakers endeavor to accomplish. Presenting facts are one thing, but to engage in human relationships speaks volumes for the environment that we were in. I greatly appreciated this opportunity to connect with new friends and colleagues to enhance all of the shared knowledge. All in all, this aspect of the BBCC conference greatly surpassed my expectations. From the daily program schedules to the cultural night, and the food and friendships obtained, these will never to be forgotten.

One of the most incredible experiences at the conference was one that I had not experienced before in all my speaking engagements. I was awarded a speaker giff for the knowledge and expertise that I shared at the conference. This gesture was so unexpected and incredibly thoughtful, so much so, that it made my heart extremely happy. I am forever grateful to Professor Qamruzzaman Chowdhury and his conference committee for including me in such an esteemed presentation.

I also wanted to touch on an incredible portion of the conference. After all research and presentations were bestowed, most speakers would typically wind down after a long day. This however was not the case in Dhaka. Firstly, I was treated to an incredible tour of Dhaka with Dr. Zakaria, and some incredible new friends. I experienced an authentic Bengali shopping experience with many hellos from the residents of Dhaka, I am forever grateful. Next we were impressed in a cultural night that was one not to be forgotten. I experienced true Bangladesh cuisine and fabulous entertainment. What an unbelievable experience and an amazing end to a prosperous and collaborative conference.

Looking forward, I am excited to have the possibility to travel back to Bangladesh in 2021 to collaborate once again at the BBCC conference or AOCMP -2021 medical physics conference in Cox Bazar. The hospitality and the friendships I made within the South Asia regions are ones that I am excited to cultivate and nurture. As medicine advances, surgical techniques improve and social and mental health is on the forefront, I most certainly am excited to share experience and expertise to bring positive change within the country of Bangladesh.

For further collaboration and networking with myself and the vision of Warrior Momma, please reach out through email at jchessell@rogers.com . As an international motivational speaker and acute care practitioner, I look forward to connecting with you all for future opportunities.

Much love and gratitude during this global pandemic and I pray you are all safe and healthy!!

The Sixth International Conference on Radiation Medicine (ICRM2020)

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The sixth International Conference on Radiation Medicine (ICRM2020) was held in Riyadh, Saudi Arabia from 09-13 of February 2020. The event was organized by King Faisal Specialist Hospital & Research Centre (KFSH&RC) in collaboration with International Atomic Energy Agency (IAEA), Al-Faisal University, the Saudi Society of Medical Radiologic Technology (SSMRT) and with leading national and international organizations and professional societies. The goal of the conference was to bring together renowned clinicians, scientists and other health professionals to share and discuss the latest advances and future innovative approaches in the field of radiation in medicine in various aspects of radiation applications in medicine in support of providing state-of-the-art, effective and safe quality healthcare.

KFSH&RC is a tertiary referral hospital and research center which offers primary and highly specialized inpatient and outpatient medical care and participates in many local and International clinical and research studies. It is recognized as one of the top hospitals specializing in Oncology, Organ Transplantation, Cardiovascular Diseases, Neurosciences and Genetic Diseases across Saudi Arabia and the world. The hospital entertains around 10,000 outpatient visits each year and houses over 1,600 beds and has 28 health outreach centers. KFSH&RC is accredited by the Joint Commission International (JCI), the Magnet Recognition Program (American Nurses Credentialing Center ANCC) and many more.

The Biomedical Physics Department, which is one of the core organizers of the ICRM is one of the major divisions of the Research Centre at KFSH&RC. The department consists of seven sections; Radiation Oncology Physics, Clinical Dosimetry & Treatment Planning, Imaging Physics, Health Physics, Secondary Standard Dosimetry Laboratory, Radiation Biology, Gamma Irradiation Facility and Molecular and Functional Imaging.

The Department provides high-quality physics support for the application of ionizing and non-ionizing radiation in clinical services to ensure the best health care possible for the patients. The department supports treatment for about 2000 cancer patients through approximately 3,500 clinical dosimetry and treatment planning procedures for radiation therapy patients utilizing major radiotherapy treatment modalities such as TomoTherapy, CyberKnife, TrueBeam, Versa HD, Mobetron, Nucletron HDR and IntraBeam Intraoperative Radiotherapy system, etc. A significant part of the department activities also includes enhancing knowledge and skills through continuing education, training opportunities, and clinical research and development. The International Conference on Radiation Medicine (ICRM) is one of the major events which is organized biennially.

The ICRM2020 prospective audience included radiologists, oncologists, medical physicists, neurosurgeons, cardiologists, clinical scientists, radiological technologists, dentists, nurses, radiochemists, radiation therapists and biomedical engineers. The scientific program included didactic lectures followed by hands-on workshops in which the latest clinical techniques were discussed and demonstrated to offer the audience the hands-on experience. The conference ended up with more than 1500 attendees from 40+ countries, 50+ international speakers, 60+ local speakers with 100+ continuing education courses that included 400+ sessions, and 80+ workshops. The 13 major themes of the scientific program were Diagnostic & Interventional Radiology, Medical Physics, Nuclear Medicine, Radiation Oncology, Radiation Protection & Safety, Radiation Emergency Management, Clinical Engineering, Radiologic Technology, 3D Printing & Visualization, Change Management in Healthcare, Artificial & Business Intelligence, Radiation Therapy, and Alfaisal University Radiology Education.

The participants of the conference earned 30 CME Hours from Saudi Commission for Health Specialties (SCHM), 29.5 AACME Hours from American Academy of Continuing Medical Education (AACME), 30 CPD Hours from The Royal College of Radiologists (RCR), 58.82 CE Hours from Commission on Accreditation of Medical Physics Education Programs (CAMPEP), 32.5 CE Hours from Medical Dosimetrist Certification Board: 32.5 CE Hours.

Dr. Belal Moftah, Chairman of the Organizing Committee and Chairman of the Biomedical Physics Department of KFSH&RC stated that, the previous five conferences of the ICRM were organized by KFSH&RC in collaboration with 27 co-organizers representing international and national institutions including the International Atomic Energy Agency (IAEA) and World Health Organization (WHO), with more than 10,000 attendees, 200+ international speakers, 240+ local speakers, 190+ workshops, 1500+ submitted abstracts, 60+ scientific exhibitions and 450+ continuing education courses.

The International Medical Physics Certification Board (IMPCB) exams part I, II and II were also conducted prior to and during the ICRM2020. Professor Dr. Golam Abu Zakaria was one of the examiners of the Board and was one of the invited international speakers of the conference.

Participants of The Sixth International Conference on Radiation Medicine (ICRM2020)

SOUTH ASIA CENTRE FOR MEDICAL PHYSICS AND CANCER RESEARCH

SCMPCR

(A Project of Alo Bhubon Trust)

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