



Medical Physics Internship During Covid-19 Pandemic- What We Lost and Gained

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The COVID-19 has swiftly overtaken medical infrastructures as noticed all over the world and this outbreak is expected to heighten. Cancer patients are immunocompromised and patients undergoing cancer treatment are at a higher risk of contracting the disease as compared to the general population. It is of paramount importance to adhere to the standard guidelines in order to prevent the transmission of the disease among the patients as well as health care providers. As internees of Medical physics in the department of Radiation Oncology, we faced many difficulties which hampered our internship program during this unexpected crisis. This article we want to share our experience during this pandemic and how it affected patient related services and our academics.

Introduction

Novel coronavirus disease 2019 (COVID-19) is a new strain of coronaviridae which was identified as the cause of an outbreak that originated from the seafood market in Wuhan, in the Hubei Province of China [1]. On 11th March 2020, World Health Organization (WHO) made the assessment that COVID-19 can be characterized as a pandemic [2]. The first case of COVID-19 in India was reported on 30th January 2020. By 4th of July, India has a total of 648,315 confirmed cases of COVID-19 and a total of 18,655 deaths [3].

This pandemic has swiftly overtaken medical infrastructures as noticed all over the world and this outbreak is expected to heighten. Even during this pandemic, cancer care remains an important objective and radiation therapy one of its vital mainstay. Cancer patients are immunocompromised and patients undergoing cancer treatment are at a higher risk of contracting the disease as compared to the general population.

India similar to many other countries has been under a nationwide lockdown to combat the outbreak escalation of this disease and this has profoundly affected cancer care and radiotherapy. Many countries have declared restrictive measures, such as lockdown, shelter in place or stay at home orders, to minimize the transmission of infection. The pandemic has affected day to day life and has adversely impacted the health care services.

In this article we account our experience of residency as a Medical Physicist Intern during the testing times of the COVID-19 pandemic.

Precaution and Preparedness

The health care workers have higher chances of getting infected by COVID-19 as compared to the general public. The oncologists and the technologists are at a higher risk of transmission especially from patients having tracheostomy and Ryle's tube as the communal transmission of COVID-19 occurs mainly via aerosol and coming in close physical contact [4]. Extensive efforts have been

undertaken to ensure exposure minimization and disease spread.

Hygiene protocols

The health care workers and the patients undergo screening separately upon their arrival. The patients are advised to wear gloves, face shields and masks and RT appointments of the patients are given at spaced intervals whenever possible to reduce chances of transmission.

After the treatment of any suspected COVID-19 patients all the equipments were sterilized. Any patients displaying symptoms of COVID-19 were advised to arrive for treatment after the completion of the rest of the patients to avoid any overlapping in the waiting area. All the healthcare workers who are coming in close proximity with the patients have been provided with N95 Mask, gloves, safety goggles, face shields and aprons as per the recommendations of MHFW, Government of India [5]. Hand wash and sanitizers are also being used for regular sanitization before and after patient interactions.

Personal Protective Equipment (PPE)

Machine technicians treated patients wearing N95 masks, face shields, hair caps and disposable gloves. Asymptomatic patients and those who were suspected of being infected were treated wearing PPE kits.

Internship Program

Machine Learning and treatment set-up

The radiation oncology departments are usually equipped with teletherapy and brachytherapy machines. These machines require trained personnel for operation and handling. Machine learning is an integral part of internship program. During this period it is mandatory to learn about the different RT machines and its working principle.

In brachytherapy, the contact time between patient and healthcare providers is more compared to EBRT. The brachytherapy procedures are usually invasive and done under general anesthesia. During the COVID-19 pandemic, most of the brachytherapy procedures were abandoned except for gynecological malignancies. Brachytherapy for esophagus, breast, soft tissue sarcoma etc. were avoided and hence the learning opportunities in these sites were hindered.

Patient setup verification during simulation and first day treatment in machine couch is an important aspect to be learned during internship. This helps to gather knowledge regarding the various uncertainties that may occur during simulation and treatment. Involvement in simulation process helps the intern in arrangement of radiation beam geometry and making a patient specific customized plan during treatment planning.

The COVID-19 pandemic has considerably reduced our patient number. To lessen the risk of transmission, preventive measures such as use of face mask, head shield and hand hygiene protocols were followed during patient setup [6]. In this scenario of low workload, we had the opportunity to understand the working and basic principles of CT images, X-Ray images, Magnetic Resonance Imaging (MRI) in depth.

Beam Calibration and Dosimetry

Medical Physicist plays an important role in ensuring accurate and precise delivery of radiotherapy to cancer patients. This involves performance of various Quality Assurance (QA) procedures for therapy and imaging equipments. International and national regulatory bodies recommend various QA procedures and their periodicity of performance [7].

At this hour of crisis additional precautionary measures and modifications were adapted keeping in view of the safety of medical workers as well as patients to avoid infection of COVID-19. Whenever possible, performance test of clinical equipments were rescheduled to avoid unnecessary risk of contamination. Wearing of gloves, face mask and head shield along with proper sanitization of equipment and surrounding areas were made compulsory during QA. The apparatus used during QA were also sanitized after performing the tests. However due to the decreased workload, we have gained more time to for learning and performing various QA tests.

Treatment Planning

Due to the ongoing pandemic, radiotherapy is becoming a preferred treatment option as surgery, chemotherapy and immunotherapy are getting postponed or cancelled. Leading cancer institutions have reported that radiotherapy is proving to be the safest and appropriate option during the COVID-19 pandemic [8]. Treatment planning is most vital part of radiation therapy and holds the key to improved patient outcome. Most of the treatment plans done during this period were simpler to reduce treatment time and minimize the use of on-board imaging. This has given us an opportunity to retrospectively audit previously planned complex conformal cases. Few complicated cases were selected from archive and re-planned by us.

In conclusion, the COVID-19 pandemic has severely affected the health care system worldwide. Its impact on the radiation treatment facilities is also profound including the radiation physics internship trainees. It is of paramount importance to adhere to the standard guidelines in order to prevent the transmission of the disease among the patients as well as health care providers. In this time of hardship, the trainees of radiation physics department may feel stressed and panic about the learning process. The trainees should follow the hygiene protocols at workplace and continue to learn and carry on the patient related works during this pandemic.

References

References

1. Pneumonia of unknown cause – China [Internet]. World Health Organization. 2020 [cited 7 July 2020]. Available from: <https://www.who.int/csr/don/05-january-2020-pneumonia-of-unknown-cause-china/en/>.
2. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV) [Internet]. Who.int. 2020 [cited 7 July 2020]. Available from: [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)).
3. IndiaFightsCorona COVID-19 [Internet]. MyGov.in. 2020 [cited 7 July 2020]. Available from: <https://www.mygov.in/covid-19>.
4. Goswami Shachindra, Yadav Bhaveshwar, Sarma Gautam, Barthakur Mithu, Goswami Pranjali. Managing Radiotherapy Practice during Coronavirus Disease 2019 Pandemic: Medical Physicist's Perspective. *Journal of Radiation and Cancer Research*. 2020; 11(1)[DOI](#)



5. Novel Coronavirus Disease 2019 (COVID-19): Guidelines on Rational Use of Personal Protective Equipment; 2020. Available from: <https://www.mohfw.gov.in/pdf/GuidelinesonrationaluseofPersonalProtectiveEquipment.pdf>.
6. [Internet]. Apps.who.int. 2020 [cited 7 July 2020]. Available from: <https://apps.who.int/iris/rest/bitstreams/1274340/retrieve>.
7. AMERICAN ASSOCIATION OF PHYSICISTS IN MEDICINE [Internet]. Aapm.org. 2020 [cited 7 July 2020]. Available from: <https://www.aapm.org/COVID19/>. [Internet]. Aapm.org. 2020 [cited 7 July 2020]. Available from: https://aapm.org/pubs/reports/RPT_46.PDF.
8. Dai Mengyuan, Liu Dianbo, Liu Miao, Zhou Fuxiang, Li Guiling, Chen Zhen, et al. Patients with cancer appear more vulnerable to SARS-COV-2: a multi-center study during the COVID-19 outbreak. *Cancer Discovery*. 2020. [DOI](#)