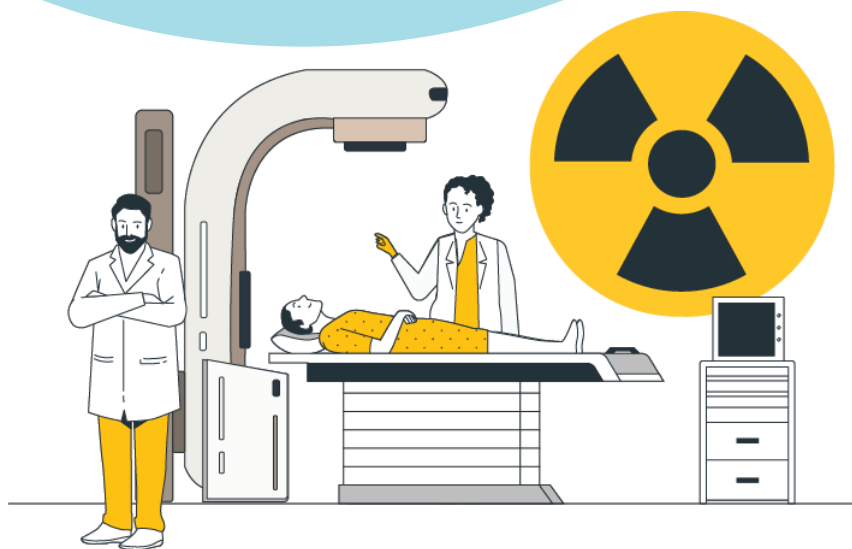


**EDUCATIONAL
BOOKLET FOR HEALTH
PROFESSIONALS AIMED AT
RADIATION THERAPY
TECHNICIANS/
TECHNOLOGISTS**




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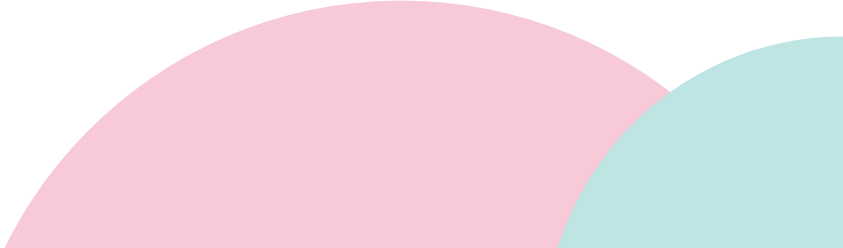


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How the radiotherapy professional should behave within the sector ^(1,2,3)

The role of the technician/technologist is fundamental during the different stages of treatment, which aims at centered and humanized care with a focus on patients. The technician/technologist actively participates in several stages throughout the patient treatment process, from the simulation performed in the computed tomography equipment, through the manufacture of accessories (for example molding of masks) for guaranteeing reproducibility, quality and patient comfort, to the analysis and verification of data, and the Linear Accelerator daily dose delivery performance.

REMINDER: Training and qualification as a professional are essential for such an important service that demands diverse responsibilities and broad functionality within the sector. Make sure you always keep studying. Follow updates from class entities and new treatment protocols.



How professionals in radiotherapy should approach and help patientsg

(1, 2, 3)

One of the fundamental roles of radiotherapy's technicians/technologists is to be by the patients' side, to accompany them and guide them to carry out their routine and treatment. Receiving the diagnosis and fighting cancer is not easy mentally and physically and, therefore, making the patient feel welcomed is very important and it can contribute to a higher commitment to the treatment.

When undergoing radiotherapy treatment, patients sometimes become closer to the treatment machines and end up creating a much greater bond with the machines than with the team itself. Technicians/technologists in this area more than any other professional in this sector are the ones who have greater contact and greater chance of proximity to patients, since most treatments usually have more than thirty days of fractionation.




EXPLORING THIS RELATIONSHIP BY CULTIVATING RESPECT, CARE, AND FRIENDSHIP GENERATES A HUMANIZED SERVICE, BUILDING A PROFESSIONAL/PATIENT LINK IN WHICH THE PATIENT FEEL SUPPORTED AND TRUST THE PROFESSIONAL.

TIPS₍₄₎

- Answer to patients' questions, teach them about the treatment and try to identify points that can cause them to miss a fraction or even give up treatment all together.
- Prepare technical explanations when you notice an apprehensive patient and have a list of resources ready.
- It is always better to hand in contact and support groups information right away than to suggest that the patient seek for it.
- For example, helping the patient make an appointment with the dermatologist is an attitude that makes the patient feel supported.

IT IS IN YOUR HANDS TO HELP ENSURE THAT THE PATIENT DOES NOT MISS THE SESSIONS AND UNDERSTAND, IN A SIMPLE AND PRACTICAL WAY, THE RADIOBIOLOGICAL IMPORTANCE RELATED TO ATTENDING SESSIONS TO HAVE A SUCCESSFUL TREATMENT.

What is the basic treatment routine in radiotherapy sector^(5, 6, 7, 8)

1. Instruct the patient to arrive on time for all treatment sessions and to be alert when his number or name is being called.
 2. Inform them that the environment is safe and that they can ask questions and clear up their doubts whenever they feel the need. If you don't know an answer, don't be ashamed! Say you will study and learn it for the next session.
 3. Show the facilities to the patient, so he can be familiarized with it.
 4. Make it clear that the staff of technicians/technologists, physicists, and physicians will accompany the first day of treatment to make the necessary adjustments before starting the first session.
 5. Inform to the patient the importance feeling as relaxed as possible when entering the room and, especially, during the positioning process. He must feel comfortable so everything goes well and don't take so long, so that he also doesn't feel tired.
 6. Make it clear that when the patient is positioned at the treatment bed, he will not be able to move anymore, otherwise the process will have to be started again.
 7. Tell them not to be scared by the size of the machine and that
- 

she will spin, make noises, but always without touching. There will be colored lights and lasers in the room. The patient will also hear calculations being made by the staff, as it is a common process for perfect centering on the treatment bed and for everything to be carried out correctly.

8. Inform the patient that x-ray images will be taken by the same treatment machine to verify their positioning.
9. Make it clear that after the physician approves your positioning based on the images that were taken in the room, the treatment will start and that they should not move
10. After the end of the first treatment session, inform the patient that the first day is usually longer because of the follow-up of the physicist and medical staff for all the first checks.
11. Tell the patient that the success of the treatment depends on him not missing sessions. And that if something happens, for him to contact the hospital immediately.
12. Ask the patient to inform you of any problems they may be experiencing such as difficulty getting to the hospital, side effects, and emotional disturbances. Have ready resources information that the patient can use. If you don't have them now, have them ready for the next treatment fraction.

How radiotherapy professionals must deal with a hectic routine within the sector⁽⁹⁾

Above all, keep your tranquility and concentration. Always guide patients when there is any delay in their opening hours. If there are delays in meeting the scheduled schedule, inform your supervisor so that he or she can help you make the necessary adjustments to circumvent the situation.

Always keep up to date with your hospital's new protocols and requirements. This will make your day to day easier.

What kinda of help professionals can find inside or outside their institutions in cases of exhaustion^(11, 12, 13, 14)

The dealing with patients with more serious clinical conditions makes professionals more susceptible to emotional stress or even Burnout Syndrome.

When a health professional presents professional exhaustion in correlation with the characteristics of the work environment, there

will be a direct impact on the quality of care provided to patients.

WARNING: If you believe that you fit into this type of situation, seek information at your institution about interventions or other possibilities that exist within occupational medicine and you will be guided on what to do and who to turn to for professional follow-up.

To relieve exhaustion, the recommendation to practice physical activities, or hobbies to be carried out outside work, aimed at the body or mind, helps to combat stress relief.

ALTERNATIVE ACTIVITY TIP: The practice of yoga or guided meditation has shown great results in the effectiveness of reducing stress and increasing compassion and satisfaction. It also helps to combat cases of Burnout Syndrome, decreasing self-demand, increasing resilience, and contributing to emotional stability.

The Radiobiology behind fractions in radiotherapy^(15,16)

Several types of radiation are used in the treatment of cancer. The most prevalent are electrons, X-rays, and gamma rays.

There are a number of effects that occur when radiation hits the human body. They are related to the intensity, energy, penetration capacity, and the ionization potential of atoms. Basically, radiation interacts with target atoms in two ways. They are:

Direct effect: when radiation directly interacts with important molecules such as DNA, which can cause genetic mutation or even cell death.

Indirect effect: when radiation interacts with water molecules causing radiolysis (changes occurring in water by absorbing high-energy radiation). This causes the water molecule to break, generating highly reactive species inside the cells, forming compounds that will attack the cell's DNA and/or cause cell death.

Tumor cells are created from a carcinogenic process with the accumulation of mutations and impaired anti-tumor gene activation. These cells have rapid division capacity, forming a tumor mass that impairs the functioning of the organ in which it is found. This mass activates a process called angiogenesis causing blood vessels to branch to feed the tumor. These nutrients diffuse to the center of the mass, causing the outer parts to have more water and oxygen than the inner parts.

The more water the tissue has, the more radiolysis occurs. Reactions with oxygen also generate active species. It can be said that oxygen works as a sensitizing agent.

For this reason, radiotherapy uses dose fractionation protocols, through daily fractions. The treatment of the patient starting radiotherapy aims to deliver radiation to reach and eliminate the most oxygenated and hydrated cells of the tumor located in the superficial layer. As a result, the less oxygenated cells undergo a natural process of reoxygenation and tumor rehydration, becoming more radiosensitive and facilitating their elimination during the delivery of the next fraction. This process is then repeated day after day through dose fractionation allowing the elimination of the tumor. At the same time, this fractionation modality also allows normal, healthy tissue that has received some percentage of dose to also recover.

Fractionation and its correct compliance are very important factors

and directly linked to the success of the treatment.

Example of how active species are formed by excitation and ionization processes and their time scale.

NORMAL CELLS



CANCER CELLS



Many cells that continue to grow and divide

Variations in size and shapes of cells

Nucleus that is larger and darker than normal

Abnormal numbers of chromosomes arranged in a disorganized fashion

Cluster of cells without a boundary

Why ensure completeness of treatment^(17, 18, 19, 20)

Incomplete or late treatment can lead to significant clinical results regarding the progression of the disease, lower chances of patient survival, and resistance to treatment depending on the cancer stage. Non-completion of treatment and interruptions impact the final result of treatment in patients.




A study carried out in Toronto, Canada, talks about the effect of treatment time and treatment interruption on the tumor after radical radiotherapy of laryngeal cancer, demonstrating that there was accelerated repopulation of tumor due to interruption intervals in treatment days.

Which factors contribute to treatment abandonment

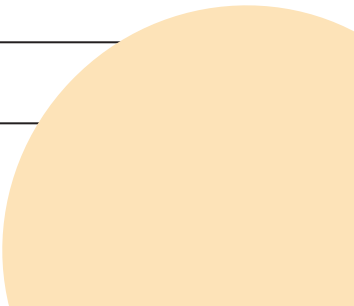
- **Adverse effects of treatment:** they range from loss of taste, burns, hair loss, nausea, vomiting, surgical interventions, among others
- **Post-traumatic symptoms:** which trigger intrusive memories, uncontrollable thoughts, nightmares, anxiety, negative mood, and emotional reactions that can lead to other psychiatric problems such as depression.
- **Lack of support:** a family member who supports the process positively causes the patient to change mood.
- **Patient education:** approaching, talking, and informing these patients through clearer language generates a more pleasant experience and can ensure that the patient strictly follows the treatment protocol.
- **Time spent on the journey to perform the treatment:** The influence of the journey to be traveled to perform the radiotherapy treatment may be more apparent in palliative radiotherapy, mainly because the difficulties of the trip may not outweigh the benefits. Patients that live in cities that do not have access to treatment also suffer, often having to travel several hours to reach a hospital in other cities.

Notes

Search contacts so the patient knows how resources available from your hospital and city. For example, when instead of suggesting that the patient get help, have contacts ready written in his booklet.







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SUPPORT WEBSITES FOR PATIENTS AND PROFESSIONALS:

<https://www.cancersupportcommunity.org/>

<https://www.cancer.net/coping-with-cancer/finding-social-support-and-information/support-groups>

<https://www.cancer.gov/about-cancer/coping/adjusting-to-cancer/support-groups>

<https://www.cancercare.org/>

<https://cancersupportuk.org/>

<https://cancer.ca/en/living-with-cancer/how-we-can-help>

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This booklet can be downloaded free of charge at
<https://61a704c4a40aa.site123.me/> along with all the bibliographic sources used for its preparation.

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