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Review

The future of Radiation Oncology: Considerations of Young Medical Doctor

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ABSTRACT

Radiation therapy plays an increasingly important role in the management of cancer. Currently, more than 50% of all cancer patients can expect to receive radiotherapy during the course of their disease, either in a primary management (radical or adjuvant radiotherapy) or for symptom control (palliative radiotherapy).

Radiation oncology is a very unique branch of medicine connected with clinical knowledge and also with medical physics. In recent years, this approach has become increasingly absorbed with technological advances. This increasing emphasis on technology, together with other important changes in the health-care economic environment, now place the specialty of radiation oncology in a precarious position. New treatment technologies are evolving at a rate unprecedented in radiation therapy, paralleled by improvements in computer hardware and software. These techniques allow assessment of changes in the tumour volume and its location during the course of therapy (interfraction motion) so that re-planning can adjust for such changes in an adaptive radiotherapy process.

If radiation oncologists become simply the guardians of a single therapeutic modality they may find that time marches by and, while the techniques will live on, the specialty may not. This article discusses these threats to the field and examines strategies by which we may evolve, diversify, and thrive.

1. Background

As a young resident in radiation oncology, working in the Greater Poland Cancer Centre I feel proud to have an opportunity to write an article about new perspectives and challenges in radiation oncology. The purpose to write this manuscript was to have a look at the situation of young radiation oncologists. I would like to discuss the position of radiation oncology in the field of oncology and to describe the Greater Poland Cancer Centre as a place where I work.

In this manuscript, I would like to raise a very important issue of new technologies in modern radiotherapy, its advantage and potential pitfalls. I will prove that there is no valuable treatment without very precise imaging.

I think that the very essential subject like system of education should be also included into this paper. At the end, I will provide a discussion on future pathways of development in radiation oncology.

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1.1. *Personal opinion*

I am specially interested in radiation therapy in gynaecological malignancies (both tele- and brachytherapy) including multidisciplinary treatment of the diseases. Currently, I am developing a doctoral thesis on the subject of intraoperative radiotherapy (IORT) in early breast cancer patients. By participating in clinical trials, I increase my skills and knowledge in the field of oncology.

2. Aim

Working in Gynaecological Radiotherapy Ward, I have encountered many difficult clinical situations and because of the multidisciplinary character of our team it is much easier to resolve them all. Every cervical patient with an intent of radical treatment is given PET/CT scan and MRI to prepare an optimum RT plan.

2.1. *Multidisciplinary team (MDT)*

Multidisciplinary meetings (MDMs) have increasingly become an important decision-making forum in oncology. These meetings bring together medical, radiation, and surgical oncologists, pathologists, physicians, radiologists, and allied health practitioners with the aim of combining the expertise from each field to generate a comprehensive and coordinated care plan for patients. Patients who are managed through such group meetings have better survival outcomes, shorter waiting times, and the benefit of more robust treatment decision-making processes than those managed without formal multidisciplinary discussions. MDMs are used extensively in my hospital in the specialties of breast, head and neck, gynaecological, and gastrointestinal cancers. Every tumour board meet once a week and discuss every difficult clinical case.

I think that the development of MDTs in cancer care has been promoted in the expectation that improved treatment decisions, coordination of cancer care, and outcomes will eventuate. The establishment of MDMs at Greater Poland Cancer Centre is a valuable educational opportunity for medical students, oncology trainees, and other health professionals, while attendance at MDMs counterbalances the unidisciplinary focus of most postgraduate oncology curricula.

3. History of the hospital

The Greater Poland Cancer Centre (WCO), established in 1953, is one of the biggest oncology centres in Poland and Europe. Its basic task is to provide specialist health care to people afflicted with cancer diseases. The centre provides medical service in the field of oncological surgery, head and neck cancer surgery, radiotherapy, chemotherapy, gynaecological oncology, anaesthesiology and intensive care, brachytherapy and diagnostics. Each year, the centre hospitalises 18,000 patients, performs 5600 operations and 8000 ambulatory procedures. Annually, over 5500 patients undergo radiotherapy treatment (along with brachytherapy), 4400 patients, system treatment (chemotherapy), and almost 11,000 patients. Ambulatory chemotherapy treatment. We receive over 160,000 annual outpatient visits annually.

Following the West European model, the centre features interdisciplinary teams providing holistic care for patients with particular types of cancers, e.g. a team providing care for patients with gynaecological malignancies, breast cancers, cancers of the upper part of the digestive tract, larynx cancers. These teams include first of all physicians of different specialities, psychologists, physical therapists, nurses, and supporting workers, e.g. social worker or dietician. Team meetings are held at least once a week.

The WCO centre has two radiotherapy departments and is famous for its use of radiotherapy and brachytherapy involving the application of modern ionizing radiation technologies for medical purposes. Currently, the centre uses 7 state-of-the-art irradiation accelerators, including Poland's first machine for tomotherapy. Additionally, the centre was the first in Poland to start treatment of prostate gland cancer by means of brachytherapy, with the use of permanent seed implants (LDR permanent implants).[24]

To the benefit of its patients, staff and students, the WCO has established its Teaching and Conference Centre. Numerous classes for students of the Poznań University of Medical Sciences and other universities are organized at the hospital. The Department of Electroradiology was founded by Prof. Julian Malicki in 2005 to improve qualifications of future RTTs (radiotherapy technologists).

Currently, in my hospital there are over 20 residents in radiation oncology. During five years of education, we have to receive training in several different areas of oncology, for example: radiotherapy grouping by sites of disease, radiobiology, imaging, medical oncology, pathology. As a group of young medical doctors, we have an opportunity to attend many conferences, courses, international exchanges between hospitals, clinical trials and scientific research projects. I have to mention at this point the Young Scientists' Forum which is dedicated to the promotion of scientific research and projects of young (under 35 years of age) radiation oncologists, medical physicists and radiobiologists in Poland.

4. Modern radiotherapy

Radiation therapy plays an increasingly important role in the management of cancer. Currently, more than 50% of all cancer patients can expect to receive radiotherapy during the course of their disease, either in the primary management (radical or adjuvant radiotherapy) or for symptom control (palliative radiotherapy). This has led to a doubling of the need for radiotherapy during the last 10 years, and a consequent expansion of radiotherapy services needed. In many countries, training of the staff involved in radiotherapy has proved to be bottleneck for the expansion. Planning and delivering radiation therapy is a complex process, based on high-tech software and hardware, and involving a wide range of staff, e.g. physicians, physicists, radiographers and radiation therapists/nurses (RTTs).

Planning of radiotherapy consists of several steps:

1. Imaging: starts with a CT scan of the patient; immobilized in the treatment position on a flatbed couch.