Available online at www.sciencedirect.com

SciVerse ScienceDirect

journal homepage: http://www.elsevier.com/locate/rpor

Review

Patterns of care of radiotherapy in México

Adela Poitevin-Chacón[a,*], *José Hinojosa-Gómez*[b]

[a] *Chief of Radiation Oncology Unit, Médica Sur Hospital, Puente de Piedra 150, Col. Toriello Guerra, Tlalpan 14080, México, DF, Mexico*
[b] *Chief of Radiation Oncology Department, Centro de Cáncer ABC, México, DF, Mexico*

ARTICLE INFO

Article history:
Received 30 July 2012
Accepted 5 September 2012

Keywords:
Patterns of care
Survey
Radiotherapy in México
Equipment
Centers

ABSTRACT

Aim: This survey is performed to learn about the structure of radiotherapy in México.
Background: Radiation oncology practice is increasing because of the higher incidence of cancer. There is no published data about radiotherapy in México.
Materials and methods: A questionnaire was sent to the 83 registered centers in the database of the Mexican regulatory agency. One out of the 32 states has no radiotherapy. 27 centers from 14 states provided their answers.
Results: 829 patients are treated annually with any radiotherapy modality in each center. Two centers have one cobalt machine, 7 have a cobalt and a linac and 10 have more than one linac. Five centers use 2D planning systems, 22 use 3D; 9, conventional simulators; 22, CT based simulation, and 1 center has no simulation. Most of the centers verify beams with films, electronic portal image devices and cone beam CTs are also used. Intensity modulated and image guided radiotherapy are performed in 5 states. Breast, prostate, cervix, lung, rectum and head and neck cancer are the six most common locations. There are 45 public and 38 private centers, 2 dedicated to children. Two gamma knife units, 5 Novalis systems, 1 tomotherapy and 2 cyberknife machines are working. All centers have at least one radiation oncologist, one physicist and one radiotherapist.
Conclusions: Definitive conclusions cannot be drawn from this limited feedback due to a low participation of centers. This survey about radiotherapy in Mexico shows the heterogeneity of equipment as well as medical and technical staff in the whole country.

1. Background

The increase in the use of ionizing radiation for cancer treatment is a worldwide phenomenon, because of a higher incidence as the life expectancy increases as well as earlier diagnoses and treatments.

Surveys could show patterns of care across the world and could be useful to improve the availability and quality of health care. Based on them, it is possible to create processes to develop measurements of quality of care, to define practice standards, to identify areas in need of improvement and to continuously assess accomplishments, based on clinical parameters. Results can create collaboration among disciplines and provide ways to enhance future surveys. Surveys may be directed to the structure (equipment and personnel), process (how patients are evaluated and treated) and outcome (results for patients).[1]

* *Corresponding author*. Tel.: +52 55 54247238/54246838; fax: +52 55 54247210.
E-mail address: adepoite@yahoo.com.mx (A. Poitevin-Chacón).
1507-1367/$ – see front matter © 2012 Greater Poland Cancer Centre. Published by Elsevier Urban & Partner Sp. z o.o. All rights reserved.
http://dx.doi.org/10.1016/j.rpor.2012.09.001

The International Atomic Energy Agency (IAEA) carried out in 2004 a general survey of RT equipment, facilities and staffing in Latin America for infrastructure.[2]

There are no studies in México that examine patterns of practice for radiation oncology.

2. Aim

Given the lack of current data on patterns of care in this discipline in Mexico, we performed the present study focusing on the structure.

3. Materials and methods

This is a descriptive pattern of care survey. It was conducted through a questionnaire directly sent electronically to each radiotherapy center, institute and public and private hospital using the data base from registered services in the National Commission of Nuclear Security and Safeguards (CNSNS),[3] which is the regulatory agency in México to health providers and to venders. The information regarding radiation oncologists was obtained from the Mexican Certification Board on Radiotherapy AC (CMCR).

4. Results

A total of 83 Mexican centers are included in the CNSNS data base. There are radiotherapy centers in all the states except two: Tlaxcala and Quintana Roo, in the latter, the installation of the first linac is taking place.

There are two centers in Mexico City specialized in children (aged up to 18 years).

27 centers answered the questionnaire, from 14 states: Mexico City 7 centers, Nuevo León 3 centers, Guanajuato 3 centers, Tamaulipas 2 centers, Jalisco 2 centers and single centers from Estado de México, Hidalgo, Querétaro, Sonora, Chihuahua, Coahuila, Colima, Aguascalientes, Puebla and Morelos.

The mean number of patients per year in all radiotherapy modalities is 829 (350–2177).

4.1. *Facilities and equipment*

There are 2 gamma knife units in the country and five dedicated Novalis systems for intracranial diseases. There is one tomotherapy unit in the north of the country and 2 cyber-knife machines, one in Mexico City and one in the northeast of the country. Intensity modulated radiotherapy and Image Guided radiotherapy is used in 5 states.

Low dose rate brachytherapy with iodine for prostate is performed in 2 centers, both in México City.

Information about brachytherapy revealed that treatments with low dose rate cesium sources manual applications and high dose rate iridium afterloading systems are performed, both primarily for gynecological treatments.

The responses of the 27 centers showed that there are 2 facilities equipped only with cobalt machines and 7 centers with both cobalt machines and linacs. Recently, the use of Linacs have become more common, currently there are 40 of them. 10 centers have more than one linac, 3 have three and one has 4.

The information from venders show: Elekta, 13 linacs working and 9 in the process of installation, Varian, 33 and 10, respectively, and Siemens 8 linacs working.

There are 5 centers that use 2D planning systems, the others use 3D. There are 9 conventional simulators, CT based simulation is performed in 22 centers; one center has no simulation at all. Most of the centers verify beams with films, but there are electronic portal image devices and cone beam CTs.

4.2. *Anatomical sites treated*

One of the centers that responded is a children's hospital, 5 most frequent locations treated there are Medulloblastoma, astrocytomas, Rabdomyosarcomas, Wilms tumors and Retinoblastoma. The responses from the rest of the centers show that breast cancer is the most frequent location in 23 centers. Prostate cancer is the first cause in one center and the second cause in 19, cervix uteri is the first cause of radiation in 2 centers and the second cause in 8, which shows the epidemiological change in this country. Lung cancer is the second cause in 2 centers and the third cause in 8. Regarding gastrointestinal tumors, the 4th tumor most treated with radiotherapy in 17 centers is rectum and in 2, stomach cancer. Head and neck cancer is the fifth cause in 9 centers, lymphoma in 6 centers, metastases and central nervous system tumours in 2 centers.

4.3. *Workloads and staffing levels*

Most of the centers[9] work 16 h, 9 centers work 12 h, 3 centers work 8, 10 and 14 h, respectively.

The Board has 217 certificated radiation oncologists, 17 have passed away. There were 42 women, 175 men.

The numbers of medical physicists employed are the following: 1 in 9 centers, 2 in 7, 3 in 4, 4 in 3, 5 in 1, and 6 in 2. The centers with more physicists are public, with more than one machine.

Three centers have one technician per machine, the others have more than one and there are 5 dosimetrists. In some cases radiotherapists have a self-trainee education; they are radiology technicians who work in radiotherapy, otherwise they receive training in a dedicated oncology institution.

4.4. *Type of cancer center*

The CNSNS database has 45 public and 38 private registered centers. There are six centers, 3 in México City and 3 in other regions of the country, where radiation oncologists are trained. Medical physicists obtain the master degree in 2 public universities.

5. Discussion

This study yields preliminary, detailed information on human and material resources available for radiotherapy in México. To our knowledge, the current report is the first to describe