

Radiotherapy Treatment in the National Health System: an Analysis of the Period from 2012 to 2016

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Tratamento Radioterápico no Sistema Único de Saúde: uma Análise do Período 2012 a 2016

Tratamiento Radioterápico en el Sistema Único de Salud: un Análisis del Período 2012 a 2016

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Abstract

Introduction: Radiotherapy is one of the therapeutic modalities in the treatment of cancer. **Objective:** To describe the epidemiology and assistance profile the radiotherapy treatment in the Unified Health System in the period 2012-2016. **Method:** Descriptive study about Authorization of Procedures of High Complexity in Oncology of the Outpatient Information System. The quantitative of national health card, the number of authorization by card, the most frequent neoplasia cases, the number of fields for the treatment of neoplasia, the average age of neoplasia treatment and the aim of treatment by licensed facilities in oncology. **Results:** 509,708 CNS were identified with a ratio of two authorization/card. Breast cancer (24.3%) and prostate cancer (18.5%) were the most frequent neoplasms. The number of fields per neoplasia was higher than the one recommended. Average age was lower for encephalon (48 years) and longer for prostate (70 years). Most of the treatment (85.2%) was for non-palliative purposes and were performed in Center of High Complexity in Oncology with Pediatric Oncology Service. **Conclusion:** The study demonstrated an increase in the number of cases/year treated with radiotherapy, evidencing an important of this therapeutic modality. Studies that characterize the profile of cases in cancer treatment are necessary to qualify the management of the health care network.

Key words: Radiotherapy; Neoplasms; Unified Health System; Information Systems.

Resumo

Introdução: A radioterapia é uma das modalidades terapêuticas no tratamento do câncer. **Objetivo:** Descrever o perfil epidemiológico e assistencial do tratamento radioterápico no Sistema Único de Saúde no período 2012-2016. **Método:** Estudo descritivo sobre as Autorizações de Procedimentos de Alta Complexidade em Oncologia do Sistema de Informação Ambulatorial. Avaliaram-se o quantitativo de Cartão Nacional de Saúde nas autorizações de radioterapia do tipo inicial, o número de autorizações por cartão, as neoplasias mais frequentes, o número de campos de radioterapia aplicados, a idade mediana e a finalidade do tratamento por estabelecimento habilitado em oncologia. **Resultados:** Identificaram-se 509.708 cartões com uma razão de duas autorizações/cartão. Mama (24,3%) e próstata (18,5%) foram as neoplasias mais frequentes. O número de campos por neoplasia foi superior ao preconizado. A mediana de idade foi menor para encéfalo (48 anos) e maior para próstata (70 anos). Maior parte do tratamento (85,2%) foi para finalidade não paliativa e foram realizadas em Centro de Assistência de Alta Complexidade em Oncologia com serviço de Oncologia Pediátrica. **Conclusão:** O estudo demonstrou um incremento no número de casos/ano tratados com radioterapia, evidenciando a importância dessa modalidade terapêutica. Estudos que caracterizem o perfil dos casos em tratamento de câncer são necessários para qualificar a gestão da rede de atenção à saúde.

Palavras-chave: Radioterapia; Neoplasias; Sistema Único de Saúde; Sistemas de Informação.

Resumen

Introducción: La radioterapia es una de las modalidades terapéuticas en el tratamiento del cáncer. **Objetivo:** Describir el perfil epidemiológico y asistencial del tratamiento radioterápico en el Sistema Único de Salud en el período 2012-2016. **Método:** Estudio descriptivo sobre las Autorizaciones de Procedimientos de Alta Complejidad en Oncología del Sistema de Información Ambulatoria. Se evaluó el cuantitativo de tarjeta nacional de salud en las autorizaciones de radioterapia del tipo inicial, el número de autorizaciones por tarjeta, las neoplasias más frecuentes, el número de campos de radioterapia aplicados, la edad mediana y la finalidad del tratamiento por establecimiento habilitado en el establecimiento oncología. **Resultados:** Se identificaron 509.708 tarjetas con una razón de dos autorizaciones/tarjeta. Mama (24,3%) y próstata (18,5%) fueron las neoplasias más frecuentes. El número de campos por neoplasia fue superior al preconizado. La mediana de edad fue menor para el encéfalo (48 años) y mayor para la próstata (70 años). La mayor parte del tratamiento (85,2%) fue para fines no paliativos y fueron realizadas en Centro de Alta Complejidad en Oncología con servicio de Oncología Pediátrica. **Conclusión:** El estudio demostró un incremento del número de casos/año tratados con radioterapia, evidenciando un importante de esta modalidad terapéutica. Los estudios que caracterizan el perfil de casos en tratamiento de cáncer son necesarios para calificar la gestión de la red de atención a la salud. **Palabras clave:** Radioterapia; Neoplasias; Sistema Único de Salud; Sistemas de Información.

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INTRODUCTION

Radiotherapy (RxT) is one of the foremost modalities for cancer treatment, alone or jointly either with surgery or chemotherapy. It is the modality with major investment in oncologic treatment, the expansion of its offer is a key national strategic for cancer control, structuring its treatment capacity and providing proper care to the patients¹.

According to the *International Atomic Energy Agency* (Iaea), world intergovernmental central forum for nuclear technical and scientific cooperation, about 50% to 60% of the oncologic cases in low and average income countries will need radiotherapy^{2,3}. Furthermore, there is an estimate that 25% of the cases will demand a new RxT^{4,5} treatment.

The RxT treatment occurs with local or locoregional irradiation of the body areas of the patient with neoplasm. It is external if done from an equipment with an irradiation source away from the organism: linear accelerator, cobalt therapy unit and ortovoltage. If from a source in contact with the body, as in brachytherapy and beta therapy, it is called internal or contact RxT^{6,7}.

External-beam radiotherapy can be of megavoltage (linear accelerator, cobalt therapy) and ortovoltage (roentgen therapy), but the linear accelerators generate much bigger energy photons; thus, they liberate lower dose for the patient's skin than the cobalt therapy unit⁷. The brachytherapy can be of low and high doses⁶.

The National Health System (SUS) provides the full treatment of the diagnosed cases of cancer in Brazilian Ministry of Health-licensed facilities as Unit of High Complexity in Oncology (Unacon) or Center of Assistance of High Complexity in Oncology (Cacon)⁸. Despite the type of permit, the facilities must ensure the surgery and chemotherapy, but the radiotherapy treatment is optional for Unacon. This does not prevent the non-radiotherapy facilities to formally refer the patients who need this therapy for the facilities that offer it.

SUS radiotherapy treatment classified as outpatient treatment of high complexity is contingent upon prior authorization: Authorization Procedures of High Complexity (Apac). Apac have to comply with multiple rules described in the "Manual de Bases Técnicas para Oncologia"⁶, (Oncology Technical-Base Manual) who aim to ensure the quality of the treatment and the patient safety.

For Apac of radiotherapy, it is necessary to register the Global Therapeutic Planning (PG) with start date and end of the treatment, goal of the radiotherapy, description of the area irradiated, topography pursuant to the International Statistical Classification of Diseases and Related Health Problems – ICD and the total number of fields⁶.

In SUS, external-beam radiotherapy is measured by fields while high dose brachytherapy is by insertion. The

field is the number of daily incidence when external-beam radiotherapy is applied, varying from one to six in a highly delimited area⁶. The average time of treatment is from four to five weeks, but it is possible to have time intervals with low or high total doses^{6,9}.

The maximum number of fields of radiotherapy expresses the total estimate dose for the radiation and varies according to the primary site of the tumor. The "Manual de Bases Técnicas da Oncologia"⁶ (Oncology Technical-Base Manual) presents a maximum limit of fields for each neoplasm, the prostate neoplasm accepts the higher number of fields (144 fields). Still, it determines that only healing purpose RxT and, when exclusive, of palliative purpose can reach the maximum number of fields; and it is allowed a number of fields higher than the defined when the therapeutic finality is anti-hemorrhage or antalgic and for the treatment of located residual tumor rescue (exception treatment).

Based in the aforementioned, the aim of this paper is to describe the SUS epidemiological and care profile of radiotherapy treatment from the information of the Apac available at the base of the "Sistema de Informação Ambulatorial" (Outpatient Information System) (SIA-SUS), and in the light of "Manual de Bases Técnicas da Oncologia"⁶ with the objective of knowing the features of cancer cases demanding this therapy and the facilities where the treatment was conducted.

METHOD

It was conducted an exploratory and descriptive study about the Apac in Oncology for radiotherapy registered in Brazil from 2012 to 2016.

Apac in Oncology data were utilized for radiotherapy (Apac-RxT) of SIA-SUS. Based in month charts of the period analyzed, it was constructed a database per federation unit. The database was restricted to Apac-RxT of the initial type¹⁰, per year when the treatment was done. Upon a preliminary analysis of neoplasms distribution frequency, the initial Apac-RxT were grouped per type of most frequent neoplasms, and the less frequent, were grouped as 'other neoplasms'.

The study did not include the one-time Apac – for procedures with no continuous treatment and Apac with continuity – that occur when the authorization is submitted in the second month of the treatment and keep the same authorization code, National Health Card (Cartão Nacional de Saúde (CNS)), procedure and ICD (CID) of the initial Apac.

Not included as well were the duplicated initial Apac-RxT because the registries were identical for the entire

variables of the database, possibly because of resubmission of the same registry at SIA-SUS.

The variables used were: 1- Neoplasm: ICD (CID) defined as principal in Apac; 2- Year of Apac: created from the variable calendar-year; 3- Licensed of the healthcare facility; 4 – Number of fields of RxT per area irradiated; 5 – Therapeutic finality of radiotherapy (antalgic, anti-hemorrhage and palliative); 6- CNS: coded data; 7- Age: continuous variable; 8 – Staging: stage 0, I, II, III and IV; 9 - Main procedure: Roentgen therapy, cobalt therapy, radiotherapy with linear accelerator only of photons and radiotherapy with linear accelerator of photons and electrons; 10 – Continuity of the treatment: (yes/no).

The type of RxT treatment was classified based in the principal procedure. The total fields per treatment was obtained by the variable ‘number of fields of RxT per area irradiated’ and the registries equal to zero were treated as *missing*. The maximum fields of the treated area per linear accelerator and cobalt therapy took into consideration the norms addressed in “*Manual de Bases Técnicas da Oncologia*”⁶. For the current assessment, initial Apac-RxT whose main procedure informed was the linear accelerator (per photons and per photons and electrons) and cobalt therapy were used because it is possible to evaluate the number of fields utilized for the RxT treatment. The choice of these procedures to describe the number of fields treated complies with Ordinance 140/2014 (Portaria 140/20148) which disposes about the production of fields per equipment.

The codes reported that did not correspond to the categories listed in the dictionary of the database¹¹ were treated as *missing* to evaluate the finality of the radiotherapy.

The year 2011 was included in the database to identify possible cases that initiated RxT before the period of interest to obtain only the CNS associated to the production of initial Apac-RxT from 2012 to 2016. This process was done by the frequency of the unique CNS and of the year of the initial Apac-RxT. Therefore, it was possible to exclude the production of CNS listed in the 2012-2016 database but have initiated their treatment in previous years.

The database was obtained at the “Departamento de Informática” of SUS (DATASUS)¹¹ website, section Services and it was *downloaded* from April to May 2017. The software R¹² version 3.4.3 was used to data analyzes.

Because secondary data, of public use, without identification of the individuals were used, the paper was deemed exempt from submission and review by the local Institutional Review Board (CEP) of the National Institutional Review Board (CONEP)¹³.

RESULTS

For the period from 2012 to 2016, 620,057 authorizations of initial Apac-RxT were selected corresponding to 509,708 CNS, already excluded the CNS and their corresponding initial Apac-RxT, whose first registry was in 2011. The number of CNS per calendar year of the treatment was around 100 thousand per year with a progressive accrual until 2014 (104,173 CNS) and dropping in later years, 99,720 new CNS in 2016 (**Figure 1**).

Year	CNS	Initial Apac-RxT
2012	100,215	115,755
2013	102,092	124,504
2014	104,173	127,751
2015	103,508	128,068
2016	99,720	123,979
Total	509,708	620,057

Excluded the CNS authorized before 2012 and its respective initial subsequent Apac-RxT

Figure 1. Number of Health National Card and initial authorizations per year

Captions: CNS: Health National Card; Initial Apac-RxT: Authorizations of High Complexity Procedures in Oncology for initial radiotherapy

Source: Outpatient Information System/Authorization of High Complexity Procedures

Of the total authorizations, 412,464 CNS appeared only once: an initial Apac-RxT for one CNS and 97,244 CNS appeared more than once, corresponding to two or more initial Apac-RxT for the same CNS. The total of initial Apac-RxT of the CNS that appeared more than once was 207,593, which resulted in a rate 2.1 initial Apac-RxT/CNS (varying between 2.0 for malignant neoplasm of stomach and 2.3 for another skin malignant neoplasm).

Among the 509,708 CNS from 2012 to 2016, 11.3% had a registry of treatment continuity. Of these, 37.1% had a record of previous treatment, 12.9% had no previous treatment and in 50.0% of the CNS, the field was blank.

During the period reviewed, the most frequent topographies were breast malignant neoplasms (C50), prostate (C61), cervix (C53), lung (C34), rectum (C20), other skin neoplasms (C44), esophageal (C15), body of the uterus (C54), larynx (C32), encephalon (C71), stomach (C16) and oropharynx (C10) corresponding to 81.4% of the authorizations.

Of the 509,708 CNS, 24.3% of the patients treated breast malignant neoplasms and 18.5%, prostate. Neoplasms in a more advanced stage (stage IV) were oropharynx and lung, with 49.9% and 48.9%, respectively (Table 1).

The majority of the authorizations (85.2%) was for non-palliative finality. Among these, the neoplasms with

Table 1. Most frequent malignant neoplasms in SUS radiotherapy treatment per CNS according to staging and therapeutic finality. Brazil, 2012 to 2016

Neoplasm	ICD	Total		Staging					Therapeutic Finality ^b		p-value ^c
		N	%	0	I	II	III	IV	% Palliative	% non Palliative	
Oropharynx	C10	10,118	2.0	5.0	6.2	13.3	25.6	49.9	11.3	88.7	<0.001
Esophageal	C15	19,838	3.9	7.0	6.3	29.4	43.8	13.5	16.0	84.0	<0.001
Stomach	C16	10,517	2.1	6.2	5.0	19.8	44.4	24.6	21.0	79.0	<0.001
Rectum	C20	23,27	4.6	8.2	6.1	32.4	38.5	14.8	14.7	85.3	<0.001
Larynx	C32	17,242	3.4	5.0	17.3	18.4	26.0	33.3	7.2	92.8	<0.001
Lung	C34	22,762	4.5	7.2	3.7	9.5	30.7	48.9	42.2	57.8	0.119
Skin	C44	17,592	3.4	7.0	38.4	28.7	16.1	9.8	6.5	93.5	<0.001
Breast	C50	123,750	24.3	8.6	19.4	30.5	29.5	12.0	10.6	89.4	<0.001
Cervix	C53	49,094	9.6	6.3	15.1	31.3	35.5	11.8	7.9	92.1	<0.001
Body of the uterus ^a	C54	12,130	2.4	8.9	34.9	24.9	20.3	11.0	8.4	91.6	<0.001
Prostate	C61	94,495	18.5	8.3	15.6	47.9	16.4	11.8	12.6	87.4	<0.001
Encephalon	C71	10,811	2.1	NA	NA	NA	NA	NA	11.7	88.3	<0.001
Other neoplasms ^a		98,142	19.2	7,9	8.9	21.1	24.7	37.4	22.9	77.1	<0.001
Total		509,708	100.0					14.8	85.2	<0.001	<0.001

Source: Outpatient Information System/Authorization of High Complexity Procedures.

Note: ^a10 missing occurred in the variable staging for neoplasm of the body of the uterus and 22,758 for other neoplasms; ^bexcluded 2,320 authorizations without information of finality of RxT; ^cp-value chi-square for homogeneity of the distribution (therapeutic finality); NA: not applicable.

major proportion were lung (42.2%) and stomach (21%), excluded other neoplasms. Despite the high proportion of stage IV oropharynx neoplasms, only 11.3% had palliative finality. The difference between the proportion of initial Apac-RxT per non-palliative and palliative finality for all neoplasms, except for lung, was significant (Table 1).

The therapeutic finality was unregistered for 2,320 initial Apac-RxT (0.5%). The proportion of non-registration of therapeutic finality per neoplasm varied from 1.3% for lung to 0.2% for cervix and body of the uterus.

The age medians were higher for skin and prostate malignant neoplasms (both with median = 70 years) and lower for cervix and encephalon, 52 and 48 years, respectively. The encephalon neoplasm presented higher variation in the age distribution and was the only who did not present any outlier (Figure 2).

The average number of fields of treated area per linear accelerator and cobalt therapy varied according to the neoplasm treated and therapeutic finality. The average number of treatments fields with palliative finality

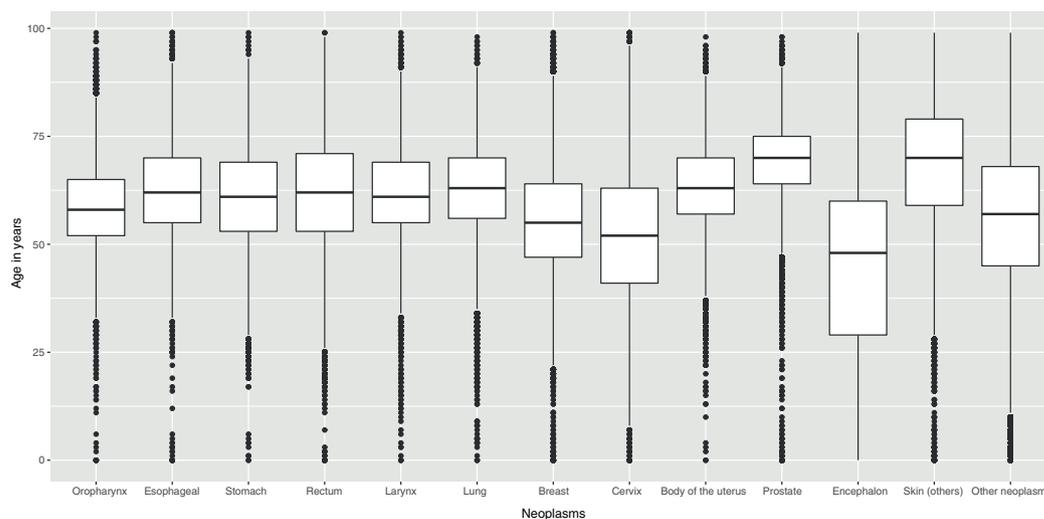


Figure 2. Median age of the cases that underwent radiotherapy treatment at SUS per most frequent neoplasms. Brazil, 2012 to 2016.

Source: Outward Information System/Authorization if High Complexity

compared to non-palliative was bigger for larynx, rectum and oropharynx. For cervix, they were practically equal (Table 2). Concerning “other skin malignant neoplasms”, it was not possible to affirm that the number of palliative cases was greater than non-palliative, since the “Manual de Bases Técnicas da Oncologia”⁶ (Oncology Technical-Base Manual) defines the limit of fields for “skin epithelial tumors” and “skin with lymphatic chains”.

The maximum number of fields of treated area per linear accelerator and cobalt therapy with non-palliative finality was greater than what was determined for breast, cervix, body of the uterus, lung, larynx, rectum, stomach and esophageal neoplasms (Table 2).

It was noticed that the majority of the cases received radiotherapy treatment in licensed facilities as Cacon with services of Pediatric Oncology, followed by Unacon with radiotherapy. The licensed facilities as Cacon presented an average number of greater CNS (4.7 to 6 thousand CNS per licensed facility), when compared to Unacon (below 3.7 thousand CNS per facility) Table 3.

It is relevant to point out that in Cacon, 25.9% of the treatments were for non-palliative finality while in Unacon Exclusive for Pediatric Oncology with Radiotherapy Service, it failed to reach 3%. The ‘non-palliative’ finality varied between 74.1 and 97.4% across the types of licensed facilities (Table 3).

DISCUSSION

For the sake of the integrality of the care, it has been deemed a relevant marker of the organization of

the access to health care services, to know the demand for radiotherapy treatment for patients diagnosed with cancer⁴. In low and average income countries, it is estimated that 50% of the cases in need of radiotherapy treatment fail to have access to these services¹⁴.

A study conducted in Brazil based in official sources indicated a deficit of 255 radiotherapy care services in the country in 2015 and a preview of a deficit of 198 health care services in 2030¹⁵, based in the population-based forecast. The current paper has contributed substantially for the planning of the access of radiotherapy treatment when it succeeded to identify the number of patients in treatment per type of neoplasm, staging and total of initial Apac-RxT used in the treatment in Apac in oncology of radiotherapy. Datta et al.⁵ draw attention for each country to be aware of its rate of use of radiotherapy based in the types of cancer and staging prior to estimate the current and future necessity of the services.

Among the leading RxT-treated malignant neoplasms, the most incident in the country are¹⁶: breast, prostate, cervix, lung and stomach cancer. These were also the most frequent neoplasms encountered at “Registro Hospitalar de Câncer” (Cancer Hospital Registry) from 2007 to 2011¹⁷, and, except stomach, are among the main neoplasms reported in palliative domicile care¹⁸.

Advanced staging was over 50% of the lung, oropharynx, larynx, esophageal, stomach and rectum cases. In an oncological treatment non-specific RxT research conducted in 2011¹⁷, of the cases that arrived at SUS licensed facilities, bronchial and lungs were also reported as the most advanced stages at entry.

Table 2. Distribution of CNS submitted to radiotherapy treatment per linear accelerator and cobalt therapy in SUS, per maximum number of fields, medium, median and maximum fields and 3rd quartile per therapeutic finality. Brasil, 2012 to 2016

Neoplasm	Maximum number of fields ¹	Palliative finality						Non-palliative finality						p-value
		CNS Total	Median	Mean	3rd Qt.	Max.	% NA	CNS Total	Mediana	Média	3° Qt.	Max.	% NA	
Breast	120		Median	Mean	3rd Qt.	Max.	%	110,346	56	62	120	144	8.7	0,94
Prostate	140	NA	40	61	144	144	7.6	82,230	132	79	144	144	7.4	0,96
Cervix	120	3,335	60	65	120	120	8.2	38,814	100	65	120	140	5.8	0,52
Body of the uterus	110	878	40	56	108	120	11.0	7,501	92	60	110	120	7.9	0,48
Other skin neoplasms	NA	1,118	25	24	30	120	12.7	12,312	25	22	30	144	4.8	0,06
Lung	90	9,491	20	32	60	120	7.5	12,979	40	46	90	144	4.4	0,37
Larynx	105	1,231	80	62	105	120	10.4	15,954	50	52	105	144	4.7	0,14
Rectum	100	3,406	75	59	100	120	6.6	19,749	56	54	100	140	6.0	0,87
Stomach	60	2,202	20	29	60	80	5.4	8,277	40	33	60	120	4.8	0,85
Esophageal	105	3,156	40	52	105	120	12.0	16,552	56	54	105	144	5.2	0,10
Oropharynx	105	1,141	66	57	105	105	10.0	8,934	55	55	105	105	4.9	0,19
Encephalon	70	1,255	39	40	70	120	8.7	9,504	70	56	90	120	4.7	0,27
Other neoplasms		22,091	20	34	40	144	10.0	71,459	40	46	90	144	6.0	0,31

Source: Outward Information System/Authorization of High Complexity Procedures.

Note: ¹Limit defined in “Manual de Bases Técnicas da Oncologia” (Oncology Technical-base Manual) - SIA/SUS; excluded 2,278 procedures per linear accelerator and cobalt without therapeutic finality; NA: Not applicable.

Table 3. Distribution of CNS submitted to radiotherapy treatment in SUS per type of licensed facility and therapeutic finality, Brazil, 2012 to 2016

Type of license in Oncology	CNS Total ^b	Licensed facilities with information	Number of CNS divided per licensed facility	Non palliative		Palliative	
				n ^c	%	n ^c	%
Cacon	84,590	18	4,699	62,208	74.1%	21,718	25.9%
Cacon with Service of Pediatric Oncology	162,587	27	6,022	144,960	89.7%	16,707	10.3%
Unacon with Services of Radiotherapy	123,877	56	2,212	106,981	86.6%	16,570	13.4%
Unacon with Services of Radiotherapy and Hematology	71,372	32	2,230	59,099	82.9%	12,149	17.1%
Unacon with Services of Radiotherapy and Pediatric Oncology	11,156	3	3,719	9,389	84.6%	1,709	15.4%
Unacon with Services of Radiotherapy, Hematology and Pediatric Oncology	29,563	11	2,688	26,392	89.9%	2,949	10.1%
Unacon Exclusive of Pediatric Oncology with Service of Radiotherapy	3,195	2	1,598	3,113	97.4%	82	2.6%
Radiotherapy Isolated ^a	23,039	11	2,094	19,820	86.1%	3,213	13.9%
Total	509,379	160	3,184	431,962	85.2%	75,097	14.8%

Source: Outpatient Information System/Authorization of High Complexity Procedures

Note: ^aunqualified service, but authorized to run radiotherapy; ^bexcluded 329 CNS (0.07%) reported by two qualified facilities in the end of 2016 and by two facilities qualified until 2012; ^cexcluded the CNS without information of therapeutic finality.

However, yet most of the cases submitted to radiotherapy treatment were in advanced staging, those with non-palliative finality answered for more than 85% of the cases, well above what was observed in Australia public radiotherapy facilities, where 57% were non-palliative¹⁹. This disparity may be accounted by the difference of classification of therapeutic finality, but other studies where errors about the information of Apac therapeutic finality can be discarded are necessary.

The median age of the breast cases treated by radiotherapy was 55 years, close to what was encountered by Grantzau et al.²⁰ whose median was 54 years. Bantema-Joppe et al.²¹ encountered median age somewhat higher, of 59 years in women who had stages 0 to III of breast cancer and were treated with conservative surgery and radiotherapy. As for the median age of cervix cancer cases, it was close to the Ferrigno and Nadalin²² study, which found the median age of 53 years for women treated exclusively with tele-cobalt and low-dose brachytherapy. Another study²³, which evaluated two distinguished periods, encountered median age of 53 years between 1992 and 1999 and of 55 years between 1999 and 2005.

For prostate cancer, Wu et al.²⁴ e Hashine et al.²⁵ report a median age of 78 and 79 years, respectively higher than those found in the current study (70 years).

A study with survivors of cerebral tumors²⁶ encountered a median age at the diagnosis of 42 years, lower than the age found in the present study, 80% of which received radiotherapy treatment. Yersal²⁷ mentions a median age higher than the median of this study, 57 years; nonetheless, the study population comprehended patients with multiform glioblastoma, of which only 5.1% received adjuvant treatment by radiotherapy.

The median age differences need to be better investigated whereas the source of information used and the quality of the register, the population of the different studies, the year of the study, the health-care network and the available local infrastructure.

The average number of fields of RxT varied according to the neoplasm and the therapeutic finality. What stands out is the number of cases of radiotherapy without information (*missings*), that are very important for the treatment monitoring and, it is worth mentioning, of mandatory completion to authorize the Apac6. So, a key aspect to this information system lays in the actual absence of critiques to mandatory fields related to the quality of the treatment offered.

The maximum number of fields reported in the initial Apac-RxT by neoplasm does not follow the maximum limit per the “*Manual de Bases Técnicas da Oncologia*”⁶,

(Oncology Technical-base Manual) indicating the non-conformity with the defined treatment parameters. It is worth mentioning that the number of fields can be higher than the recommendation for RxT of metastasis, but this field is unavailable at Apac database, which hinders its assessment. Considering these findings, it would be important to conduct local assessments to clarify why the Apacs that overpass the number of fields are being authorized.

The evaluation of the radiotherapy production per type of SUS licensed facility is important to monitor the supply of these services in face of the demand. Whereas 60% of new cancer cases will need RxT^{2,3} and the estimate¹⁶ of new 417,010 cases, except non-melanoma skin for 2018, 250,206 new patients/year would need RxT. The actual paper encountered an increase of 100,000 patients/year for RxT treatment, which suggests the potential non-absorption of a demand of more than 50% of those in need.

This repressed demand is commensurate to the proportion estimated by Zubizarreta et al.¹⁴. When the production of the oncology-licensed facilities is evaluated, it is important to consider the installed capacity of each one of them, which is given by the number of linear accelerators and cobalt therapy facilities. This justifies the biggest production of RxT encountered in the licensed facilities as Cacon that count with extended installed capacity when compared with Unacon.

The study brings relevant issues for the management, planning, evaluation and monitoring of the health-care to the oncologic patient that need to be addressed *vis à vis* the priority to the quality of the care provided. For such, it is necessary to evaluate what means to have a total number of fields higher than what is advised and attempt to commensurate the proportion of advanced staging and palliative treatments finality and assess the capacity of absorption of new cases face to the accrue observed and a possible non-absorption of 50% of the demand for radiotherapy.

The scarcity of similar studies reiterates the relevance of the present paper and, at the same time, restrains the discussion about the comparability of the results presented. Still, it points out the necessity of researches that are able to provide information that support the management of the supply of oncologic treatment.

Though it was not the study's goal to evaluate the quality of the Apac existing data, it isn't possible to not note the potential these data have for the planning and management of the oncologic treatment, regardless the fragility of the system because of the non-criticism of some variables. Much of what is described in the "*Manual de Bases Técnicas da Oncologia*"⁶ is not followed in the

databases, which weakens the analyzes and hampers the follow up of cancer cases submitted to this therapeutic modality. Nonetheless, some of the findings in the paper hereby are supported by the literature for the most frequent cases, age and staging.

CONCLUSION

Radiotherapy is present in large part of the therapeutic plans of oncologic patients and, pursuant to the current paper, there was a raise of 20% of the number of cases demanding radiotherapy treatment. Thus, it is of essence to count with some impressive planning to ensure the access to this therapeutic modality or the quality of the treatment supplied.

It is important to have more studies, which focus in the description of the epidemiologic scenario and the treatment offered to patients with cancer to support the management for the organization of the health care network in compliance with SUS principles.

CONTRIBUTIONS

Jeane Glauca Tomazelli contributed with the study conception and design, analysis and interpretation of the data, wording and relevant critic revision of the intellectual content of the manuscript. Adriana Tavares de Moraes Atty contributed with the study conception and design, extraction, analysis and interpretation of the data, wording and critic revision of the intellectual content of the manuscript. Antônio Carlos Antunes Bertholasc collaborated with the analysis and interpretation of the data and relevant critic review of the intellectual content of the manuscript. Maria Beatriz Kneipp Dias collaborated with the analysis and interpretation of the data, wording and relevant critic review of the intellectual content of the manuscript. All the authors approved the final version of the manuscript and state they are responsible for all the aspects of the paper, ensuring its accuracy and integrity.

DECLARATION OF CONFLICT OF INTERESTS

Nothing to declare.

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