

# Artikel 1

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## CURRENT RADIOTHERAPY FACILITIES IN INDONESIA

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### ABSTRACT

**Background:** WHO in 2014 declared globally cancer is a major cause of morbidity and mortality. Selection of cancer treatment includes surgery, radiotherapy or chemotherapy. Approximately 50-60% of cancer patients require radiotherapy. Treatment of cancer in LMICs and challenge to make radiotherapy as a key component of cancer treatment that can be accessed patient is a foremost concern of all stakeholders both at national and international levels.

**Objective:** Acquire an overview of the Indonesian radiotherapy facility in 2015.

**Methods:** Using the results of studies conducted based on literature studies and field studies.

**Results:** The development of Indonesian radiotherapy centers in 2015, when compared to 2008 increased by 22.72%. Overall there was 41 external radiotherapy equipment. There is 23 Unit using a Linear Accelerator and 18 Unit using Co-60 equipment. The Estimation of patients who will receive radiotherapy services in 2015 approximately 29,300 patients. When compared with patients who need radiotherapy approximately 199,940 patients, only 14.65% which can be served.

**Conclusion:** Need an arrangement from the Indonesian Government to assist the treatment of radiotherapy for Social Security Organizing Bodies participants. Monetary cost is built on radiation techniques, not just in a class that is based on the number of hospital rooms.

**Key words:** Radiotherapy, cancer and social security organizing bodies

### Introduction

According to the WHO Cancer is a term for a large group of diseases that can affect any part of the body, also known as malignant tumors and neoplasms. Another trait of cancer is the creation of abnormal cells that grow quickly out of the habit which can then invade adjoining parts of the body and spread to other organs, the latter process is called metastasis, which is the leading cause of cancer deaths [1].

According to the World Cancer Report 2014, published by the International Agency for Research on Cancer (IARC) of the World Health Organization (WHO), Globally cancer remains a major cause of morbidity and mortality with 14 million new cancer cases and 8 million cancer-related deaths reported in 2012 [2]. Approximately 60% of cancer cases occur in countries of Africa, Asia, Central and South America with 70% of cancer deaths are from these areas.

According to the World Health Organization (WHO), the incidence of cancer between 2008 and 2030 is projected to rise 82% in the group of low-income countries (lower income

countries), up 70% in the group of lower-middle income countries (Lower middle Income Countries) and up 58% in upper-middle income countries (upper middle income countries). There is a rise in cancer incidence by 40% in high-income countries (HICs). The case in LMICs is equal to two-thirds of all cases [3]. According to the World Bank, Indonesia grouped into Lower Middle Income country [4]. Indonesia is the world's fourth most Populous nation, with 249.9 million people [5]. The Ministry of Health of the Republic of Indonesia held a Basic Health Research (Riskesdas) in 2013, the results showed the prevalence of tumor / cancer in Indonesia is 1.4 per 1000 population. Indonesia's highest cancer in women is breast cancer and cervical cancer. Whereas in men are lung cancer and colorectal cancer. The highest prevalence occurs in Yogyakarta at 4.1 per 1000 population. The prevalence in North Sumatra is 1 per 1000 population [6]. The Government of Indonesia in 2015 through the Ministry of Health of the Republic of Indonesia has started commitments cancer prevention in Indonesia, together with national cancer prevention committee (KPKN) and Indonesia Cancer Foundation. Commitment Cancer Prevention activities in

Indonesia, for special attention to: 1) Improvement of promotive and preventive efforts to raise public awareness about cancer; 2) Development of early detection in order to reduce the number of cancer deaths; 3) Treat cancer according to the standard, the necessary monitoring and evaluation of the effectiveness of alternative treatments that are offered through the mass media and electronic; 4) Improved quality of life for cancer patients through effective palliative effort; 5) Support all elements of society in a comprehensive cancer control and continuous [7]. The main purpose of diagnosis and treatment of cancer is to cure or prolong the life of patients and ensure the best quality of life that can be done for people with cancer. Selection of treatment modality should be done with caution between surgery, radiotherapy or chemotherapy. Selection is based on the best evidence-based treatment given available resources [8]. Radiotherapy uses radiation such as X-rays, gamma rays, electron beams or protons to damage cancer cells and stop the growth. Radiotherapy is the treatment of localized, directed only to the part of the body that requires [9]. High-energy radiation used will permanently damage the DNA of cancer cells. Other healthy body tissues will be affected temporarily, but these cells were able to repair this DNA damage and still grow normally [10]. Radiotherapy if used before surgery to shrink tumors so more easily removed when surgery is known as neoadjuvant treatment. If done after surgery to destroy remaining tumor known as adjuvant treatment [10]. Curative use of radiation called a radical treatment, aimed at providing long-term beneficial effects for patients. Radiation can also be given before or after chemotherapy to improve overall treatment outcomes. Palliative treatment aims to shrink tumors and reduce pain. Palliative treatment can also extend the life of [11]. Radiotherapy play an important role in the fight against cancer. Approximately 50-60% of all cancer patients in need of radiotherapy in the treatment of the disease [12,13]. The current situation of the treatment of cancer and cancer in LMICs challenge to make radiotherapy, as a key component of cancer treatment, which can be accessed in these countries has become a major concern that is recognized by all stakeholders both at the country level and internationally [14, 15].

## Method

This paper represented the results of a study conducted by literature studies [16,17] and field studies to obtain a picture of radiotherapy facility in Indonesia by 2015 [18].

## Result

Development of radiotherapy centers in Indonesia when compared with data from the literature [16,17] has increased by 22.72%. Overall there were 41 aircraft external radiotherapy, which uses Linear Accelerator Unit 23 18 Unit again while using Co-60, as seen in Table 1. One unit that uses a Co-60 is used for stereotactic radiation surgery (SRS) is Leksell Gamma Knife in Siloam Hospital Lippo Village.

The calculations were carried out to see estimates of cancer patients that can be served with teletherapy equipment are 60 new patients / month. So if in the calculations for 1 year, then the number reached 720 patients that can be served for 1 teletherapy machine unit. This calculation is still within tolerance limits specified by the International Atomic Agency (IAEA) which mentions for the state Low Middle Income Countries such as Indonesia, One unit can serve 500-1000 Aircraft teletherapy patient per year [15]. Estimates of the number of patients who will receive radiotherapy services in 2015 approximately 29,300 patients. When compared with patients who need radiotherapy approximately 199 940 patients, only 14.65% which can be served. This figure is a rough idea of the conditions in Indonesia and will change if the use of Indonesia's population in the latest census. Estimates of the number of patients will decrease if accounted for more details about the down time and the number of fractionated radiotherapy equipment specifically for each type of cancer. Advanced radiotherapy techniques such as Intensity Modulated Radiation Therapy (IMRT) is already on the island of Sumatra, namely in the Mumi Teguh Memorial Hospital, using IMRT QA equipment and software Gafchromic Film PTW Verisoft. In 2008, the radiation technique such as Intensity Modulated Radiation Therapy, Stereotactic Radiation Surgery (SRS), Stereotactic Body Radiation Therapy (SBRT) only in the General Hospital of the National Center Cipto

Mangunkusumo, but now there Muchtar Riadi Comprehensive Cancer Center Hospital (MRCCC), and in the Siloam Hospital TB Simatupang. Both of the above hospitals have been using Rapid-Arc, which the advantages of this technique compared to IMRT is a faster treatment time. While Dharmais Cancer Hospital and Gading Pluit Hospital just the IMRT technique.

Soetomo Hospital in Surabaya also has the ability to run this IMRT techniques. Data in 2008 stated that there are 8 active radiotherapy centers do Brachytherapy Technique. These performed in 2 Dimensions Brachytherapy technique, using the C-Arm. In the 2015's, 3D Brachytherapy techniques already exist in three hospitals in Indonesia, namely in Dharmais Cancer Hospital in Jakarta, Saiful Anwar General Hospital in Malang and Murni Teguh Memorial Hospital in Medan.

### Discussion

In 2008, the entire hospital which have radiotherapy facilities owned by the Government of the Republic of Indonesia. Currently Private Hospital has had radiotherapy facilities. There are 2 Private parties who have radiotherapy facilities in Medan - North Sumatra ie Murni Teguh Memorial Hospital and Vina Estetica Hospital. There are six private hospitals have radiotherapy facilities in the island of Java, Pertamina Central Hospital, MRCCC Hospital, Siloam TB Simatupang Hospital, Gading Pluit Hospital in North Jakarta, Siloam Hospital Lippo Village in Lippo Karawaci, Banten and Ken Saras Hospital in Ungaran Central Java. Ownership Hospital by private parties would be a bit much into account the investment made in providing radiotherapy services. Today almost all hospitals work together in serving participants the social insurance agency participants should get radiotherapy services, the Hospital who have radiotherapy facilities should provide radiotherapy services with a predetermined amount of tariff value.

The amount of rates depending on the class Hospital. If you look carefully you can bet that as the Government Hospital Referral Regions with the number of rooms in which more certainly has a higher grade than the Private Hospital. Noting that the Government has not been able to meet the adequate provision of radiotherapy facilities in Indonesia, the hospital had radiotherapy facilities need to be given incentives or take into account the rate is based technique Radiotherapy given to the patient. Currently there is a problem in view of the Government through INA-CBGs rates only know one Coding (excluded on Top Up) in an outpatient procedure that is Radiotherapy. There is no difference in rates between hospitals having LINAC Facility sophisticated techniques such as IMRT Hospital who have radiotherapy facilities Co-60 with 2D techniques. Thus the patient care of the social insurance agency can be maximized and encourage advances in techniques of treatment given.

### Conclusion

Limitations on various things in this paper does not diminish the important message that Indonesia is still very short of radiotherapy centers. Shortcomings in terms of equipment availability and distribution, access to radiotherapy centers which are unevenly distributed and affordability of treatment. The Government of Indonesia through the program social insurance agency has made affordability of treatment is no longer a burden, but if the government has not been able to provide the rate calculation based radiotherapy technique, it needs to make cost sharing between the patient and the government [15]. So in the end the government's commitment in the Cancer Prevention activities in Indonesia with one of the points for special attention on Improving the quality of life of cancer patients through effective palliative efforts may be improving the quality of life of patients through effective curative measures.

Tabel 1. Availability of Treatment

No	PROVINCE	POPULATION AT 2010 CENSUS*	RT C	LINAC	INCIDENCE NATIONAL **	Need RT (60%)	TREAT/YEAR ***
1	SUMATERA UTARA	12.982.204	3	3	0	18.175	10.905 2160
a.	RS MURNI TEGUH MEMORIAL HOSPITAL	LINAC 3DC + IMRT		I			
b.	RSUP H ADAM MALIK	LINAC 3DC		I			
c.	RS VINA ESTETICA	LINAC 3DC		I			
2	SUMATERA BARAT	5.133.989	1	0	1	7.188	4.313 720
a.	RSUP M DJAMIL - PADANG	LINAC 2DIMENSION			I		
3	RIAU	5.538.367	1	1	0	7.754	4.652 720
a.	RSUD ARIFIN ACHMAD - PEKANBARU	LINAC 2DIMENSION		I			
4	SUMATERA SELATAN	7.450.394	1	0	1	10.431	6.258 720
a.	RSUP DR MOHAMMAD HUSIN				I		
5	BANTEN	10.632.166	1		1	14.885	8.931 500
a.	RS SILOAM HOSPITAL - LIPPO VILLAGE	LEKSELL GAMMA KNIFE PERFEXION****			I		
6	DKI JAKARTA	9.607.787	7	11	3	13.451	8.071 10080
a.	RSUPN DR CIPTO MANGUNKUSUMO	LINAC 3DC + IMRT+ IGRT+SRS/SRT		III	I		
b.	RS KANKER DHARMAIS	LINAC 3DC + IMRT		II			
c.	RSPAD GATOT SOEBROTO	LINAC 3DC		I	I		
d.	RS MRCCC - SEMANGGI	LINAC RAPID ARC (VMAT)		I			
e.	RS SILOAM - TB SIMATUPANG	LINAC RAPID ARC (VMAT)		I			
f.	RS PERSAHABATAN	LINAC 3DC		I	I		
g.	RS PUSAT PERTAMINA	LINAC 3DC		I			
h.	RS GADING PLUIT	LINAC 3DC + IMRT		I			
7	JAWA BARAT	43.053.732	1	1	1	60.275	36.165 1440
a.	RSUP HASAN SADIKIN BANDUNG			I	I		
8	JAWA TENGAH	32.382.657	4	1	4	45.336	27.201 3600
a.	RSUD DR MOEWARDI - SOLO				I		
b.	RS DR MARGONO - PORWOKERTO				I		
c.	RSUP DR KARIADI - SEMARANG	LINAC 3DC			II		
d.	RS KEN SARAS - UNGARAN	LINAC 3DC		I			
9	DAERAH ISTIMEWA YOGYAKARTA	3.457.491	1	1	1	4.840	2.904 1440
a.	RSUP DR SARDJITO			I	I		
10	JAWA TIMUR	37.476.757	3	3	3	52.467	31.480 4320
a.	RSUD DR SOETOMO - SURABAYA	LINAC 3DC + IMRT		II	I		
b.	RSAL DR. RAMELAN - SURABAYA	LINAC 3DC		I			
c.	RSUD SYAIFUL ANWAR - MALANG	Co-60 2D			II		
11	BALI	3.890.757	1	0	1	5.447	3.268 720
a.	RSUP SANGLAH - DENPASAR				I		
12	KALIMANTAN TIMUR	3.026.060	1	1	0	4.236	2.542 720
a.	RS ABDUL WAHAB SJAHRANI	Co-60 2D		I			
13	KALIMANTAN SELATAN	3.626.616	0	0	1	5.077	3.046 720

a.	RSUD ULIN - BANJARMASIN	Co-60 2D						
14	SULAWESI SELATAN	8.034.776	2	1	1	11.249	6.749	1440
a.	RS UNIVERSITAS HASANUDDIN	LINAC 3 DC						
	RSUP DR WAHIDIN							
b.	SUDIROHUSODO	Co-60 2D						
15	ACEH	4.494.410	0	0	0	6.292	3.775	0
16	BANGKA BELITUNG	1.223.296	0	0	0	1.713	1.028	0
17	BENGKULU	1.715.518	0	0	0	2.402	1.441	0
18	KALIMANTAN TENGAH	2.212.089	0	0	0	3.097	1.858	0
19	SULAWESI TENGAH	2.635.009	0	0	0	3.689	2.213	0
20	NUSA TENGGARA TIMUR	4.683.827	0	0	0	6.557	3.934	0
21	GORONTALO	1.040.164	0	0	0	1.456	874	0
22	JAMBI	3.092.265	0	0	0	4.329	2.598	0
23	LAMPUNG	7.608.405	0	0	0	10.652	6.391	0
24	MALUKU	1.533.506	0	0	0	2.147	1.288	0
25	KALIMANTAN UTARA	622.350	0	0	0	871	523	0
26	MALUKU UTARA	1.038.087	0	0	0	1.453	872	0
27	SULAWESI UTARA	2.270.596	0	0	0	3.179	1.907	0
28	PAPUA	2.833.381	0	0	0	3.967	2.380	0
29	KEPULAUAN RIAU	1.679.163	0	0	0	2.351	1.410	0
30	SULAWESI TENGGARA	2.232.586	0	0	0	3.126	1.875	0
31	KALIMANTAN BARAT	4.395.983	0	0	0	6.154	3.693	0
32	NUSA TENGGARA BARAT	4.500.212	0	0	0	6.300	3.780	0
33	PAPUA BARAT	760.422	0	0	0	1.065	639	0
34	SULAWESI BARAT	1.158.651	0	0	0	1.622	973	0
	<b>TOTAL</b>	<b>238.023.673</b>	<b>27</b>	<b>23</b>	<b>18</b>	<b>333.233</b>	<b>199.940</b>	<b>29300</b>

\* = Sensus Penduduk Tahun 2010

\*\* = DATA RISKESDAS 2013 HAL 86 ( 1,4 permil)

\*\*\* = Assume 1 Equipment will treat 720 patient/year (60 patient/month)

\*\*\*\* = Calculation based on 2 px/day x 5 day/week X 50 week, Ref : [20].

RT C = Radiation Therapy Center

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PAGE 1

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PAGE 2

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PAGE 3

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PAGE 4

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PAGE 5

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PAGE 6

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