

COST ANALYSIS THERAPY OF BREAST CANCER PATIENTS IN Prof. Dr. MARGONO SOEKARJO PURWOKERTO

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Abstract

Background. Breast cancer is leading cause of death in Indonesia. Treatments for breast cancer is generally in combination therapy i.e chemotherapy, radiation and surgery. Various cancer therapies require a lot of drugs. Various side effects also occurred in cancer therapy and require additional drugs. This leads an increasing in the overall cost of the total cost incurred by cancer patients.

Objectives. The purpose of this study was to describe the treatment case, treatment and the average cost of breast cancer patients in ProfDr. Margono Soekarjo Hospital Purwokerto in 2010.

Methods. This research was a descriptive study with retrospective data and used total sampling method to obtain the data from medical records and receipts. The breast cancer patients data from January to December 2010 period was taken.

Outcomes measured. Medical and non medical costs are calculated. The average cost was calculated by dividing the total cost of side effects with the total direct costs incurred in cancer patients.

Results. The result showed that 39 patients included in the inclusive criteria. The highest number cases was patient in stage IIIC, 23 cases (59.00%). Alkylating and antimetabolit agent combination was the most widely used for chemotherapy, as many as 31 cases (81.57%). Analysis of direct and non direct medical costs : stage IIa third class was Rp. 23,669,472.50. In stage IIb, second class was Rp. 38,062,480.30, and in third class was Rp. 11,063,230.90. In stage IIIA second class was Rp. 22,523,373.00, while for third class was Rp. 20,380,060.73. Stage IIIB for third class was Rp. 13,503,594.00. In stage IIIC second class was Rp. 37,873,859.00 and third class was Rp. 11,256,590.00. Last stage is stage IV, in third class was Rp. 14,345,890.30.

Conclusion. The results indicated that hospital need to be more attention for handling breast cancer therapy, particularly, because it has higher therapy cost than anyother disease.

Key words : Cost Analysis, Breast Cancer, Prof. Dr. Margono Soekardjo Hospital

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INTRODUCTION

Based on the Hospital Information System (SIRS) data, in 2007, breast cancer was first ranks in hospitalized patients in Indonesia (16.85%) (Anonymous, 2010). In Central Java, according to a report of the District Health Office, in hospitals and health centers in 2006, there were breast cancer cases per 1,000 people (Anonymous, 2006). According to the America Cancer Society (2011), breast cancer is the uncontrolled growth of cells in the breast. Malignant tumor is a group of cancer cells that can be grown and then invade surrounding tissues or spread (metastasis) to distant areas of its origin.

There are four treatment were used in breast cancer, including surgery, radiation, chemotherapy and biological therapy (Balmer et al., 2005). Surgery is usually done by taking some cancerous tissues or whole breast removal, depending on the stage of cancer. Second breast cancer treatment using radiation, with high-tech tools required expertise to operate it. For chemotherapy, the patient using more than one drug (combination drugs). Treatment usually in a cycles, depending on the severity or stage of breast cancer patients. Radiation and chemotherapy has side effects such as nausea, vomiting, anemia, etc. thus requiring additional costs to handle this side effect. (Balmer et al., 2005). Therefore, in the treatment of breast cancer required huge cost.

Pharmacoeconomics use to identify the pharmaceutical products and health services cost, which describes the health economic relationship involving drugs, services, and prices used by the public (Jana et al., 2005). In this study, we carried out Pharmacoeconomics study, using Cost Analysis method (Shancez, 2005) to explore the overall cost in the treatment of breast cancer in Prof. Dr. Margono Soekarjo Hospital in January-December 2010.

METHODS

Research design. This research was a descriptive study with retrospective data. We

used total sampling method. Data were obtained from medical records, financial receipts and cards in inpatient Margono Soekarjo Hospital, January to December 2010. Research point of view was the perspective of the hospital.

The inclusion criteria used were patients with a primary diagnosis of breast cancer who underwent anticancer treatment in Margono Soekardjo Hospital Soekarjo in 2010 and patients were classified as public health insurance and health insurance category.

Data collection. Data were collected from medical records include number, age, clinical diagnosis, date of entry, date of exit, long of stay, the patient's outcome, and medications used during treatment. Financial receipts include therapeutics costs, hospitalization costs, laboratory costs, medical costs, nutrition costs, side effect costs, and administrative costs. We also obtained data from the drug card in installation of pharmacy hospital included drugs and medical equipment costs.

Data analysis. Research data in the form of patient demographic characteristics (age), characteristics of breast cancer cases (characteristic diagnosis, staging, the last condition of patients, the identification of patterns of breast cancer therapy) and treatment costs were analyzed descriptively. Cost analysis is done by looking at the major components and the cost incurred by patients during treatment.

Calculating total direct costs using the formula:

$$AB = BT + BP + BG + BTn + BPEST + BOA + BRI + BA$$

AB	: Cost Analysis - Medical and Non-Medical costs
BT	: Therapeutics Costs
BP	: Laboratory Costs
BG	: Nutrition Costs
BTn	: Medical Costs
BPEST	: Side Effect Costs
BOA	: Drugs and Medical Devices Costs
BRI	: Hospitalization Costs
BA	: Administrative costs

Calculate the average cost using the formula :

$$X = \frac{C}{n}$$

- X = The average cost of treatment of breast cancer (IDR) (per therapy/stadium)
 C = Total direct costs (IDR) (per therapy/stadium)
 n = number of patients (per therapy/stadium)

RESULTS AND DISCUSSION

Data population were 128, five (5) cases with incomplete medical record data, 8 cases with no receipts, and 78 cases were not up to six times chemotherapy treatment cycle so only 39 cases include to inclusion criteria. The distribution of each class were 7 patients class II and 32 patients as class III. The number of breast cancer patients were 39 female patients (100%).

The most patient affected by breast cancer are between the age of 44-52. The American Cancer Society in 2011, stated that cancer was susceptible at above 40 years. Redalli and Radice (2003) in their review article also mentioned that women are usually affected by breast cancer at 40-50 years. This is because of the lack of early detection in every woman in that age, who susceptible to breast. Patient were grouped into two classes, class II and class III.

Treatment class will affect the direct medical costs. In Prof. Dr. Margono Soekarjo hospital there are three classes, class I, II and III. However, in this study, for breast cancer patients was in class II and III. In this study, most patients were treated in the third grade as many as 32 patients (82%) and class II were 7 patients (18%).

The side effects of chemotherapy are effects arising from cytostatika drugs used in chemotherapy in the treatment of breast cancer.

According to Balmer *et al.*, (2005) there are several types of side effects caused by chemotherapy, among which bleeding while undergoing chemotherapy, anemia, nausea, vomiting, pain, infections, constipation and fluid

retention. The side effects of chemotherapy is the most frequent nausea and vomiting. There were 38 patients (51.35%) with nausea and vomiting caused by chemotherapy. The second highest is anemia by 22 (29.72%) patients.

Treatment for breast cancer patients depends on the. The American Joint Committee For Cancer (AJCC, 2003), grouped the stadium of breast cancer into eight groups. Each stadium had a different treatment. In this study, we found no cases for all stages, only stage IIa, IIb, IIIa, IIIb, IIIc and IV.

The most cases are patients with chemotherapy, 38 cases. In stadium IIIc patient who undergoing chemotherapy are 23 patients. The second type of treatment for breast cancer is surgical with totally 6 cases, 3 radical mastectomy (removal of the affected breast cancer) and 3 incisional biopsy (taking a small portion of solid tumor tissue). According to the National Cancer Institute (2009), the first option of treatment for stage IIa, IIb and IIIa is by radiation or surgery, then chemotherapy may be performed as an adjuvant or neo-adjuvant. Then for stage IIIb and IIIc, first choice treatment is chemotherapy and surgery. But for the surgery, it must be confirmed first, the extent to which cancer cells spread. Then for stage IV or metastatic, the first choice for treatment is use high-dose chemotherapy.

Balmer *et al.* (2005) stated that class of drugs that are still commonly used for breast cancer treatment are antimetabolite, alkilating agents and topoisomerase inhibitors. There are 31 patients in class III, who used antimetabolite, alkilating agent and topoisomerase inhibitors as combination. It is the highest number of patient who use drugs combination compared with other combination. While in class II, there was 4 patients using a combination of a taxane, alkilating agents and topoisomerase inhibitors.

Additional drugs that most commonly used are antiemetics, because the most frequent adverse effects from breast cancer chemotherapy are nausea and vomiting. Drugs used for cytostatica in this study are cyclofosamid

(?1,500 mg) and dacarbazin that fall into the high risk category (> 90%) cause nausea and vomiting. Doxorubicin and cyclofosamid <1,500 mg, epirubicin which includes medium category (30-60%) cause nausea and vomiting, 5-Flurourasil, paxus and ebetaxel are in the low category (10-30%) which causes nausea and vomiting. Vincristine is entered in the category of low (<10%) cause nausea and vomiting. This is in accordance with the Hesketh (2008) and Hawkins (2009) research.

Primasari (2009) stated, regarding the evaluation of antiemetic use in Prof. Dr. Margono Soekarjo Hospital Purwokerto, the most widely used antiemetic to overcome the side effects of chemotherapy are dopamine antagonists and histamine antagonists.

We found in our study, the most commonly used antiemetic are dopamine antagonists and histamine antagonists. According to Hesketh (2008), in a review article, the most effective anti-nausea vomiting caused by chemotherapy is serotonin antagonists (5-HT3).

Serotonin antagonist clinically proven to be effective for the treatment of nausea and vomiting caused by chemotherapy in cancer patients. The mechanism that probably involved is when serotonin out of cell enterokromafin then binds to 5-HT3 receptors located on sensory nerve / vagal afferents in the gastrointestinal tract, and delivers stimulation through the nerves to the vomiting center and chemoreceptor trigger zone (CTZ) in the brain postrema. 5-HT3 antagonist (Ondansetron) works by blocked the receptors in the periphery and in the CTZ to prevent vagal stimulus that ultimately prevent nausea and vomiting (Ikawati, 2006). However, in this study, not all patients using 5-HT3 class to overcome the effects of nausea and vomiting due to the price is relatively more expensive when compared with other drugs.

Cost analysis of breast cancer therapy in our study conducted by the hospital perspective focused on direct medical costs and non-medical costs. We explored the data in order to determine what are the components of the costs and how much it costs in breast cancer patients during treatment at the hospital in accordance with patients stadium.

Components of direct medical costs consist of the treatment costs, laboratory costs, physicians costs, side effects treatment cost and medical equipment costs. While the cost of non-medical components are consisting of administrative costs, hospitalization costs and nutrition costs.

Breast cancer treatment costs is a cost incurred for patients undergoing breast cancer therapy (Table I). Included the cost of surgery, radiation and chemotherapy for six cycles every two weeks for 3-5 months.

Table I. Average of Treatment Cost Based on Stadium in breast Cancer Therapy in Prof.Dr.MargonoSoekarjo Hospital in 2010.

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
I	-	-
IIa	-	15,000.000
IIb	32,329,590	6,957,572
IIIa	14,443,000	14.424.998
IIIb	-	7,611,378
IIIc	30,784,010	5,922,540
IV	-	7,260,000

Expenses are incurred for supporting the breast cancer diagnosis. Includes laboratory tests, examination of the thorax, and the other assesment according to the current stage of patient (Table II.).

Table II. Average Laboratory Cost Based on Stadium of Breast Cancer Therapy in Prof.Dr.Margono Soekarjo Hospital in 2010.

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
I	-	-
IIa	-	442,500
IIb	1,563,000	1,718,438
IIIa	2,033,000	2,024,000
IIIb	-	1,563,000
IIIc	1,875,600	1,563,000
IV	-	2,615,000

Expenses in a patient was vary depending on the class and type of therapeutic treatment. Differences in the cost of each class is due to the difference in rates imposed in each class, include physician costs (Table III). The more severe or high stage and type of therapy used, cause many treatment have to take. The longer long of stay the greater costs have to paid.

Table III. Average Physicians Cost Based on Stadium in Breast Cancer Therapy in Prof.Dr.Margono Soekarjo Hospital in 2010

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
I	-	-
IIa	-	210,000
IIb	510,000	423,750
IIIa	660,000	495,000
IIIb	-	735,000
IIIc	462,000	383,055
IV	-	360,000

Side effects costs is a costs incurred as a result of the side effects of treatment (surgery, radiation and chemotherapy) (Table IV). It is include the cost of medicine and blood transfusions.

Table IV. Average of Side Effects Costs Based on Stadium in Breast Cancer Therapy in Prof.Dr.Margono Soekarjo Hospital in 2010

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
I	-	-
IIa	-	140,990.50
IIb	512,132.75	1,013,465.37
IIIa	1,562,935.00	1,175,304.50
IIIb	-	1,388,547.50
IIIc	2,020,057.00	1,247,157.44
IV	-	2,008,952.75

Medical equipment costs are costs incurred to purchase the medical equipment and consumables equipments during the patient hospitalize (Table V.).

Table V. Average of Medical Equipments Costs Based on Stadium in Breast Cancer Therapy in Prof.Dr.Margono Soekarjo Hospital in 2010

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
I	-	-
IIa	-	75,937.50
IIb	376,757.50	280,618.75
IIIa	253,947.50	251,300.00
IIIb	-	255,668.75
IIIc	281,942.56	278,895.83
IV	-	271,937.50

Non-medical costs are costs incurred for administrative interests, the cost of hospitalization and cost of nutrition during patient stay in hospital (Table VI).

Table VI. Average of administrative Costs Based on Stadium in Breast Cancer Therapy in Prof.Dr.Margono Soekarjo Hospital in 2010.

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
I	-	-
IIa	-	10,000
IIb	60,000	63,750
IIIa	70,000	70,000
IIIb	-	60,000
IIIc	60,000	60,000
IV	-	60,000

For patients undergoing chemotherapy, hospitalization costs can be calculated with one cycle during therapy in a span of 3-5 months to six cycles and then calculated the average cost (Table VII.).

Table VII. Average of Hospitalization Costs Based on Stadium in Breast Cancer Therapy in Prof.Dr.Margono Soekarjo Hospital in 2010

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
Ia	-	-
IIa	-	7,700,000
IIb	2,250,000	1,498,750
IIIa	3,300,000	1,815,000
IIIb	-	1,760,000
IIIc	2,190,000	1,430,000
IV	-	1,320,000

The lowest hospitalization cost is in stage III patients, due on this stage, patients only undergoing chemotherapy for six cycles, each cycle usually takes only two to three days. The other stages are usually needed more than one type of therapy, causing a longer hospitalization, so hospitalization costs become more expensive.

Nutritional costs are costs incurred for the cost of food production and nutrition consultations (Table VIII).

Table VIII. Average of Nutrition Costs Based on Stadium in Breast Cancer Therapy in Prof.Dr.Margono Soekarjo Hospital in 2010.

Stadium	Class	
	II (IDR)	III (IDR)
0	-	-
Ia	-	-
IIa	-	70,000
IIb	204,000	141,250
IIIa	320,500	165,000
IIIb	-	160,000
IIIc	229,700	215,000
IV	-	120,000

Medical and non-medical costs are the direct costs incurred by patients during treatment in hospital (Table IX - Table XIV).

Table IX. Average of Medical and Non Medical Costs in Stadium IIa Breast Cancer Patients in Prof.Dr.Margono Soekarjo Hospital in 2010

Components	Class III	
	IDR	Percentage (%)
Therapy Costs	15,000,000.00	63.42
Hospitalization Costs	7,700,000.00	32.55
Laboratory Costs	442,500.00	1.87
Physician Costs	210,000.00	0.88
Side Effect Costs	140,990.50	0.59
Medical Equipment Costs	75,937.50	0.32
Nutrition Costs	70,000.00	0.29
Administrative Costs	10,000.00	0.04
Total	23,649,428.00	100.00

Table X. Average of Medical and Non Medical Costs in Stadium IIb Breast Cancer Patients in Prof.Dr.Margono Soekarjo Hospital in 2010

Components	Class II		Class III	
	Jumlah (Rp)	Percentage (%)	Jumlah (Rp)	Percentage (%)
Therapy Costs	32,329,590.00	85.51	6,957,572.00	57.51
Hospitalization Costs	2,250,000.00	5.95	1,498,750.00	12.38
Laboratory Costs	1,563,000.00	4.13	1,718,438.00	14.20
Physician Costs	510,000.00	1.34	423,750.00	3.50
Side Effect Costs	512,132.75	1.35	1,013,465.37	8.37
Medical Equipment Costs	376,757.50	0.99	280,618.75	2.31
Nutrition Costs	204,000.00	0.53	141,250.00	1.16
Administrative Costs	60,000.00	0.15	63,750.00	0.52
Total	37,805,480.25	100.00	12,097,594.12	100.00

Table XI. Average of Medical and Non Medical Costs in Stadium IIIa Breast Cancer Patients in Prof.Dr.Margono Soekarjo Hospital in 2010

Components	Class II		Class III	
	IDR	Percentage (%)	IDR	Percentage (%)
Therapy Costs	14,443,000.00	63.78	14,424,998.00	70.63
Hospitalization Costs	3,300,000.00	14.57	1,815,000.00	8.88
Laboratory Costs	2,033,000.00	8.97	2,024,000.00	9.91
Physician Costs	660,000.00	2.91	495,000.00	2.42
Side Effect Costs	1,562,935.00	6.90	1,175,304.50	5.75
Medical Equipment Costs	253,757.50	1.12	251,300.00	1.23
Nutrition Costs	320,500.00	1.41	165,000.00	0.80
Administrative Costs	70,000.00	0.30	70,000.00	0.34
Total	22,643,192.50	100.00	20,420,602.50	100.00

Table XII. Average of Medical and Non Medical Costs in Stadium IIIb Breast Cancer Patients in Prof.Dr.Margono Soekarjo Hospital in 2010

Components	Class III	
	IDR	Percentage (%)
Therapy Costs	7,611,378.00	56.24
Hospitalization Costs	1,760,000.00	13.00
Laboratory Costs	1,563,000.00	11.54
Physician Costs	735,000.00	5.43
Side Effect Costs	1,388,547.50	10.26
Medical Equipment Costs	255,668.75	1.88
Nutrition Costs	160,000.00	1.18
Administrative Costs	60,000.00	0.44
Total	13,533,594.25	100.00

Table XIII. Average of Medical and Non Medical Costs in Stadium IIIc Breast Cancer Patients in Prof.Dr.Margono Soekarjo Hospital in 2010

Components	Class II		Class III	
	IDR	Percentage (%)	IDR	Percentage (%)
Therapy Costs	30,784,010.00	81.21	5,922,540.00	53.35
Hospitalization Costs	2,190,000.00	5.77	1,430,000.00	12.88
Laboratory Costs	1,875,600.00	4.94	1,563,000.00	14.08
Physician Costs	462,000.00	1.21	383,055.55	3.45
Side Effect Costs	2,020,057.00	5.32	1,247,157.44	11.23
Medical Equipment Costs	281,942.56	0.74	278,895.83	2.51
Nutrition Costs	229,700.00	0.60	215,000.00	1.93
Administrative Costs	60,000.00	0.15	60,000.00	0.54
Total	37,903,309.56	100.00	11,099,648.82	100.00

Table XIV. Average of Medical and Non Medical Costs in Stadium IV Breast Cancer Patients in Prof.Dr.Margono Soekarjo Hospital in 2010

Components	Class III	
	IDR	Percentage (%)
Therapy Costs	7,260,000.00	51.79
Hospitalization Costs	1,320,000.00	9.41
Laboratory Costs	2,615,000.00	18.65
Physician Costs	360,000.00	2.56
Side Effect Costs	2,008,952.75	14.33
Medical Equipment Costs	271,937.50	1.94
Nutrition Costs	120,000.00	0.85
Administrative Costs	60,000.00	0.42
Total	14,015,890.25	100.00

Table XV. Cost Analysis of Medical and Non Medical Costs in Breast Cancer Patients in Prof.Dr.Margono Soekarjo Hospital in 2010

Components	Average of Medical and Non Medical Costs	
	Class II (IDR)	Class II (IDR)
0	-	-
I	-	-
IIa	-	23,649,428.00
IIb	37,805,480.25	12,097,594.12
IIIa	22,643,192.50	20,420,602.50
IIIb	-	13,543,594.25
IIIc	37,903,309.56	11,099,648.82
IV	-	14,015,890.25

In our study, patients with stage IIIb taken surgical therapy and six chemotherapy cycles. Patients usually have to take medication to overcome the side effects caused by chemotherapy.

According Radelli and Radice (2003) the most expensive cost is in the most severe stage, ie stage IV. However, in our study, the greatest of average direct medical costs are among stage IIa (Table 15.). This can be due to the difference of the individual components for treatment in breast cancer patients. This difference can be seen from not every patient get all kinds of tests to support the diagnosis and treatment of breast cancer. Then, the absence of Home Health Care (the control exercised by the hospital for patients undergoing breast cancer therapy). Home health care is the second greatest costs in direct medical cost in Redelli and Radice research.

In our study, the most expensive cost is therapy cost. This result is in good agreement with research by Redelli and Radice (2003). The cost of breast cancer treatment is the cost of chemotherapy, surgery costs, charges and expenses, and radiation in each stage.

CONCLUSION

The results indicated that hospital need to be more attention for handling breast cancer therapy, particularly, because it has higher therapy cost.

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