

**CHEMOTHERAPY UTILIZATION OF BREAST CANCER IN CANCER CENTER, THAILAND**Chaninun Ketkaew^{1*}, Kitisuk Thepsuwan¹, Niyada Kiatying-Angsule²¹Chonburi Cancer Center, Department of Medical Services, Ministry of Public Health, Thailand²Faculty of Pharmaceutical Science, Chulalongkorn University, Thailand***Corresponding author e-mail:** tokkid@yahoo.com**ABSTRACT**

This study aimed to describe chemotherapy utilization situation of breast cancer patients after NHSO cancer protocol version 2010 had been launched. The 3,485 chemotherapy prescriptions of out-patient departments between January to June 2010 were analyzed. The most common prescribed chemotherapy regimens were Fluorouracil+Doxorubicin+Cyclophosphamide or FAC regimen (36.15%, 1,260 prescriptions), Cyclophosphamide+Methotrexate+Fluorouracil or CMF regimen (16.15%, 563 prescriptions), Doxorubicin+Cyclophosphamide or AC regimen (14.84%, 517 prescription), Paclitaxel (12.63%, 440 prescriptions), Capecitabine (7.49% 261 prescriptions) and Docetaxel (4.88%, 170 prescriptions). Each cancer center was significantly different in the utilization pattern due to the incidence of cancer type, hospital formularies and hospital policy ($p = 0.00$). 92.14% of all chemotherapy prescriptions adhered to NHSO cancer protocol. The highest ratio of adherence to cancer protocol was UC scheme (96.45%) and the lowest one was CSMBS scheme (75.50%). Each health benefit scheme was significantly different in ratio of adherence to protocol ($p = 0.00$). The total cost of chemotherapy regimen was 20,677,599 Baht. 16,704,514 Baht (80.79%) was the cost of adherence to protocol prescriptions.

Keyword: Chemotherapy, Utilization, Breast cancer**INTRODUCTION**

The number of breast cancers in Thailand rose to 20,000 cases in 2008 and 4,600 breast cancer deaths. The new case breast cancers were detected in up to 37% of all new cancer patients per year¹. Breast cancer treatment needs multimodality specialists such as for chemotherapy, radiotherapy, surgery, hormone therapy and targeted therapy. Chemotherapy still has the major role in treatment of breast cancer in Thailand because of long term study in efficacy and many generic drugs in the market². There have been many expensive new innovative medicines launched to the market especially targeted therapy drugs. The data of 138 large public hospitals from the comptroller general's department shown the anticancer drugs used in the Civil Servant Medical Benefit Scheme (CSMBS) was in the top-ten of high expenditure³. In Thailand there are three health

benefit schemes; CSMBS serves for government officers around 4.97 million people⁴, Social Security Scheme (SSS) serves for private sector employee around 10.33 million people⁵ and Universal Coverage Scheme (UC) serves for other Thai citizens around 48.62 million people⁶. All health benefit schemes aim to provide healthcare services that cover all important diseases especially cancer. Three years ago, many policies for controlling anticancer drug prescribed were implemented. CSMBS indicated anticancer drug code X for reimbursing of in-patient department. The audit system from the comptroller general's department aimed to detect the irrational anticancer drugs used in CSMBS. In 2010, National Health Security Office (NHSO) launched the NHSO cancer protocol² for 7 cancers; breast, cervix, ovary, nasopharynx, lung, esophagus and colon-rectum. The objectives of NHSO cancer protocol were for use as the treatment guideline in all health benefit schemes.

The protocol indicated the ceiling chemotherapy cost per cycle for reimbursing online in UC scheme. This study was conducted in healthcare provider perspective to describe the situation of chemotherapy utilization in each scheme after NHSO cancer protocol had been launched and compare the actual prescribed cost with the reimburse cost..

MATERIAL AND METHODS

This retrospective study was conducted in 7 regional cancer centers under the department of medical services; Pathumthani (the middle), Lopburi (the lower North), Lumpang (the North), Chonburi (the East), Ubon Ratchathani (the lower NorthEast), Udonthani (the top of the NorthEast) and Suratthani (the South). Cancer centers are the tertiary care responsible for referred patients within the province. The information obtained from the prescriptions of breast cancer patients who visited at out-patients department between January – June, 2010. The data collected included age, scheme, prescriber specialists, chemotherapy regimen, cost of chemotherapy regimen, and comparison of chemotherapy regimen with NHSO cancer protocol. The data was analyzed by using Microsoft Excel 2003 and SPSS statistical package version 17.0 for Windows. Descriptive statistics were used to describe the characteristics of prescriptions and chi-square was used to find the association between factors affecting the utilization pattern.

RESULT

3,485 chemotherapy prescriptions from 1,306 breast cancer patients who had visited out-patient department of 7 regional cancer centers were analyzed. There were 3,481 prescriptions (1,304 patients; 99.99%) of female and 4 prescriptions (2 patients; 0.01%) of male patients. Most prescriptions were under UC scheme (2,446 prescription; 70.19%), and the others were SSS (492 prescriptions; 14.12%) and CSMBS (453 prescriptions; 12.99%). The average age of all patients was 50.66 ± 10.302 years old, the youngest patient and the oldest patient were 20 years old and 83 years old respectively. Chemotherapy regimens were prescribed by 5 specialists such as oncologists (2,923 prescriptions; 83.87%), onco-hematologists (345 prescriptions; 9.90%), onco-surgeon (17 prescriptions; 0.49%), surgeon (155 prescriptions; 4.45%) and radiologist (43 prescriptions; 1.23%).

Five common prescribed chemotherapy regimens have been shown in Table 2 Fluorouracil+Doxorubicin+Cyclophosphamide or

FAC (1,260 prescriptions; 36.15%), Cyclophosphamide+Methotrexate+Fluorouracil or CMF (563 prescriptions; 16.15%), Doxorubicin+Cyclophosphamide or AC (517 prescriptions; 14.84%), Paclitaxel (440 prescriptions; 12.63%), Capecitabine (261 prescriptions; 7.49%) and Docetaxel (170 prescriptions; 4.88%). Each cancer center was significantly different in pattern of chemotherapy prescribed regimen ($p = 0.00$, p value ≤ 0.05). There were four reasons, why each cancer center was significantly different in pattern, which were; 1) cancer incidence of their province (do you mean prevalence or type of cancer?), 2) hospital formularies, 3) drug policy of the hospital and 4) awareness of financial status. The department of medical services assigned different strategies related to the important cancer of each area. (Where is this department of medical services located, in the hospitals, in the regional or national health authorities?) Therefore the hospital policy would be consistent with their cancer problem and hospital formularies selected would rely on their policy. The centers had already reviewed the NHSO cancer protocol before enforcement, so their costs were analyzed and adjusted. Some regimens were asked to prescribe only by in-patient departments for reimbursing by DRG (Diagnosis Related Group) system.

The actual prescribed chemotherapy regimens were compared with NHSO cancer protocol version 2010. The chemotherapy regimens under the NHSO protocol are FAC, CMF, AC, Paclitaxel and Docetaxel. The regimens that are not under the NHSO protocol are FEC/EC (E = Epirubicin), TAC/TC (T = Docetaxel), Paclitaxel+Carboplatin, Navelbine, and Gemcitabine. The data showed 3,211 prescriptions (92.14%) adhered to protocol. The UC scheme's prescriptions complied with the NHSO protocol up to 2,359 prescriptions (96.45%) whereas the CSMBS's prescriptions complied with NHSO protocol only 342 prescriptions (75.50%). The NHSO cancer protocol was aimed for use as a treatment guideline in all schemes, but each health benefit scheme was significantly different in pattern of chemotherapy prescribed regimen ($p = 0.00$, p value ≤ 0.05).

The costs of chemotherapy which complied with NHSO protocol were 16,704,514 baht (80.79%) and the total cost of chemotherapy was 20,677,599 Baht. The cost of chemotherapy regimens were compared between each scheme as shown in Table 3.

The average actual cost/cycle of chemotherapy was compared with reimbursed cost by the regimen. Docetaxel regimen was been compared because it

was reimbursed as medicine by government pharmaceutical organization (GPO). The average actual cost of AC and FAC regimens were over the reimbursed cost. The data has been shown in Table 4. Chemotherapy regimens were prescribed individually related to body surface area (BSA) of patients, so the cost per prescription was different. Each prescription was reimbursed as exact cost, but not more than reference cost.

DISCUSSION

Chemotherapy regimen in NHSO cancer protocol version 2010 must be prescribed only for out-patients department because of reimbursement condition in UC scheme. That's why this study analyzed only prescriptions of out-patients. Most prescriptions were prescribed by oncologist who mainly responsible for medication treatment. Other prescriptions were sometime prescribed by other specialists because of more workload of oncologists.

The common prescribed chemotherapy regimen of all centers in Thailand different from the recent study in France that showed a reduction of CMF use over time⁶, but Anthracycline-base and Paclitaxel regimen prescriptions rose (77% of patients)^{7,8}. There were significantly different in pattern of prescribed in each center. There were four reasons, why each cancer center was significantly different in pattern, which were; 1) cancer incidence of their province (do you mean prevalence or type of cancer?), 2) hospital formularies, 3) drug policy of the hospital and 4) awareness of financial status.

The department of medical services, Ministry of Public Health assigned different strategies related to the important cancer of each area. Therefore the hospital policy would be consistent with their cancer problem and hospital formularies selected would rely on their policy. The centers had already reviewed the NHSO cancer protocol before enforcement, so their costs were analyzed and adjusted. Some regimens were asked to prescribe only by in-patient departments for reimbursing by DRG (Diagnosis Related Group) system.

The ratio of adherence to the protocol in UC scheme was higher than other scheme, because of the different level of enforcement in each scheme.

Cancer patients under UC scheme strictly adhered to NHSO cancer protocol because the healthcare provider would be reimbursed by e-claimed system. Therefore, the ratio of adherence to NHSO protocol of the UC scheme was higher than other schemes. Cost of chemotherapy regimen that adhered to protocol seems to be fully reimbursed, while cost of non-adhered chemotherapy regimen seems loss especially in UC scheme.

The average cost per cycle of most chemotherapy regimen seems not more than reference cost except AC and FAC regimen. The healthcare provider would be reimbursed as the real cost not exceed the reference cost per cycle. However chemotherapy regimen was prescribed due to body surface area (BSA), so healthcare provider should review their cost of each medicine to protect their lost.

CONCLUSION

The study was carried out to describe chemotherapy utilization of breast cancer patients after NHSO cancer protocol version 2010 had been launched. Each cancer center was significantly different in utilization pattern due to different context of cancer incidence, hospital formularies and policy. Chemotherapy prescriptions in all cancer centers adhere highly in proportion to the NHSO cancer protocol. UC scheme was highest proportion of adherence to the NHSO guideline because the payer will not reimburse if those regimens were out of protocol. CSMBS scheme was lowest in adherence to guideline because the payer reimburses immediately even out of protocol. Adherence to the NHSO guideline is the indicator of appropriate use of medicine. Healthcare providers can use this information to review their practice for promoting rational use of chemotherapy drugs, balancing the equality of treatment between schemes and monitoring cost of treatment.

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Table 1 Characteristics of chemotherapy prescriptions

	Center							Total
	1	2	3	4	5	6	7	
Number of prescriptions(%)	742 (21.29)	1,120 (32.14)	290 (8.32)	436 (12.51)	135 (3.87)	421 (12.08)	341 (9.78)	3,485
Number of patients(%)	225 (17.23)	425 (32.54)	107 (8.19)	185 (14.17)	53 (4.06)	167 (12.79)	144 (11.03)	1,306
Health Benefit Scheme								
- CSMBS (%)	76	151	45	26	24	64	67	453 (12.99)
- UC (%)	516	798	213	259	102	323	235	2,446 (70.19)
- SSS (%)	118	151	32	151	7	12	21	492 (14.12)
- Other (%)	32	20	0	0	2	22	18	94 (2.70)
Gender								
- Female	3,481 (99.99%)							
- Male	4 (0.10%)							
Age (Mean ± SD)	50.66 ± 10.302 years							
Prescriber specialist (no. (%))								
- Oncologist	2,923 (83.87%)							
- Onco-Hematologist	345 (9.90%)							
- Onco-Surgeon	17 (0.49%)							
- Surgeon	155 (4.45%)							
- Radiologist	43 (1.23%)							
- Other	2 (0.06%)							

(1.Chonburi 2. Lopburi 3.Lumpang 4.Pathumthani 5.Suratthani 6. Ubonratchathani 7. Udonthani)

Table 2 Chemotherapy Utilization in each cancer center

Center	1	2	3	4	5	6	7	Total
Complied with NHSO protocol 2010								
CMF	167 (22.51%)	224 (20.00%)	11 (3.79%)	45 (10.32%)	0	24 (5.70%)	92 (26.98%)	563 (16.15%)
AC	42 (5.66%)	140 (12.50%)	58 (20.00%)	63 (14.45%)	22 (16.30%)	119 (28.27%)	73 (21.41%)	517 (14.84%)
FAC	343 (46.23%)	354 (31.61%)	91 (31.38%)	152 (34.86%)	70 (51.85%)	168 (39.90%)	82 (24.05%)	1,260 (36.15%)
Paclitaxel	46 (6.20%)	168 (15.00%)	41 (14.14%)	101 (23.17%)	30 (22.22%)	0	54 (15.84%)	440 (12.63%)
Docetaxel	40 (5.39%)	41 (3.66%)	64 (22.07%)	2 (0.46%)	5 (3.70%)	0	18 (5.28%)	170 (4.88%)
Capecitabine	4 (0.54%)	82 (7.32%)	18 (6.21%)	46 (10.55%)	8 (5.93%)	101 (23.99%)	2 (0.59%)	261 (7.49%)
Total	642 (86.53%)	1,009 (90.09%)	283 (97.59%)	409 (93.81%)	135 (100%)	412 (97.86%)	321 (94.15%)	3,211 (92.14%)
Not complied with NHSO protocol 2010								
FEC/EC	0	67 (5.98%)	1 (0.34%)	0	0	3 (0.71%)	0	71 (2.04%)
TAC/TC	0	23 (2.05%)	0	0	0	0	9 (2.63%)	32 (0.92%)

Paclitaxel + Carboplatin	1 (0.13%)	4 (0.36%)	0	1 (0.23%)	0	0	0	6 (0.17%)
Other Chemotherapy	99 (13.34%)	17 (1.52%)	6 (2.07%)	26 (5.96%)	0	6 (1.43%)	11 (3.22%)	165 (4.73%)
Total	100 (13.47%)	111 (9.91%)	7 (2.41%)	27 (6.19%)	0	9 (2.14%)	20 (5.85%)	274 (7.86%)
Overall prescription	742 (100%)	1,120 (100%)	290 (100%)	436 (100%)	135 (100%)	421 (100%)	341 (100%)	3,485 (100%)

Table 3 Chemotherapy utilization in different scheme

Chemotherapy Regimen	Health Benefit Scheme				
	CSMBS	UC	SSS	Other	Total
Complied with NHSO Protocol					
Number of prescriptions (% within scheme)	342 (75.50%)	2,359 (96.45%)	429 (87.20%)	81 (86.17%)	3,211 (92.14%)
Cost (Baht)	3,540,584	10,515,182	2,270,969	377,779	16,704,514 (80.79%)
Not complied with NHSO Protocol					
Number of prescriptions (% within scheme)	111 (24.50%)	86 (3.55%)	64 (12.80%)	13 (13.83%)	274 (7.86%)
Cost (Baht)	2,722,134	191,981	934,184	124,786	3,973,085 (19.21%)
Total Cost (Baht)	6,262,718	10,707,163	3,205,153	502,565	20,677,599

Table 4 Compared cost/cycle between average actual cost and reference cost

Regimen	Reimbursed cost/cycle (Baht)	Average actual cost/cycle (Baht)
CMF	1,700	1,590.00
AC**	1,750	1,907.56
FAC**	2,000	2,188.72
Paclitaxel	19,650	19,205.21
Capecitabine	14,200	13,095.58

** : Average actual cost/cycle was more than reimbursed cost/cycle

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