The Cost Analysis Using the Clinical Practice Guideline and Cost Minimization Analysis in Orthopaedic Inpatients under the Universal Coverage Policy Admitted to Siriraj Hospital

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ABSTRACT

Objective: The hospital revenues are decreasing from the government policy in the universal coverage while increasing the hospital expenses. The cost analysis is a very important tool for the strategic plan in the hospital expenses reduction with standard quality. This study wanted to investigate the cost of 12 orthopaedic diseases using the clinical practice guideline (CPG) at maximum length of stay (LOS) and to compare the cost before and after utilization management in cost minimization analysis in orthopaedic inpatients under the universal coverage policy.

Methods: Part 1, The CPG with maximum LOS was studied in detail and the cost analysis was performed using the formula C = S+I+X+P+O+L+A+R while C = unit service cost/case, S = service cost, I = instrument cost, X= X-ray cost, P = prosthetic cost, O = operating cost, L = laboratory cost, A = anesthetic cost, R = recovery room cost. Part 2, the cost minimization analysis (CMA) before and after utilization management was studied in 2 groups. Group A consisted of 236 cases which were studied after utilization management from June 1, 2003 to February 24, 2005. Group B consisted of 89 cases from June 1, 2002 to May 31, 2003 which were studied before utilization management was introduced in the department. The cost of both groups were compared.

Results: The cost of the 12 orthopaedic diseases ranged from 13,036.10 baht/case for 3 days LOS in club foot surgery to 99,532.73 baht/case for 21 days LOS in total hip replacement surgery. The reduction of 1 day LOS reduces the service cost by an average 1,844.26 baht. The CMA found that after utilization management in group A, the CMA in the average cost reduction was 3,274.45 baht/case with an average 2.07 days reduction in length of stay. Both groups had the same outcomes.

Conclusion: The cost analysis was done in 12 orthopaedic diseases using CPG. The usefulness with cost reduction was found after implementation of utilization management.

Keywords: Cost analysis, CPG, cost minimization analysis, universal coverage policy

Siriraj Med J 2008;60:114-120
E-journal: http://www.sirirajmedj.com

As the new government policy in the universal coverage begins, the hospital revenues are falling significantly[1,2]. As hospital revenues are decreasing, hospital expenses are increasing in the same time. In an era when hospital reimbursement is capped by the diagnosis related group reimbursement system with a global budget, new services, new products and rising labor costs are squeezing in already tight hospital operating budgets[3]. In order to deliver high quality orthopaedic operations that make use of new technology on a profitable or break-even basis keeping the standard quality, hospitals must reduce the expenses associated with these procedures. Two basic strategies have been

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normally used to lower the cost of hospital care, first, the reduction of utilization[4-8] and second, the reduction of the unit costs of resources[9-12]. In 2003, the department of orthopaedic surgery developed UMOST (Utilization Management Orthopaedic Siriraj Team) and CPG (Clinical Practice Guideline) in 12 orthopaedic diseases. The utilization management was integrated to all of the physicians and nurses using the indicator "ORTHOPAEDICS" and successfully reduced the average expense of the hospital by 5,919.79 baht/case and reduced the average length of stay by 2.69 days[13].

In the reduction of the unit costs of service in the department, the first step is the cost analysis of the unit services cost and then the reduction can be planned. This study wanted to perform the cost analysis in 12 orthopaedic diseases using CPG with maximum length of stay (LOS) and compare the cost before and after utilization management in orthopaedic inpatients under universal coverage policy using cost minimization analysis (CMA).

MATERIALS AND METHODS

Part 1. Cost analysis using CPG with maximum length of stay (LOS)

The CPG was done in 12 orthopaedic diseases: herniated nucleus pulposus, femoral neck fracture, spinal stenosis, cervical spondylosis, osteoarthritis knee, AVN (avascular necrosis) hip, ACL (anterior crucrate ligament) insufficiency, femoral shaft fracture, brachial plexus injury, club foot, osteosarcoma, and chronic osteomyelitis. The cost was calculated on the maximum length of stay prescribed in CPG. All of the variables were collected from CPG with this formula.

$$C = S + I + X + P + O + L + A + R$$

C = Unit service cost per case
S = Service cost per case
I = Instrument cost per case
X = X-ray cost per case
P = Prosthetic cost per case
O = Operating cost per case
L = Laboratory cost per case
A = Anesthetic cost per case
R = Recovery room cost per case

1.1 Service cost (S)

Using the formula $S = 1{,}844.26\ t_1$

t_1 = The maximum length of stay (from the day of admission to the day of discharge presbribe in CPG).

We collected the data from 5 orthopaedic wards in the period from October 2005 to April 2006 and found that the average service cost was 1,844.26 baht/day of admission.

1.2 The instrument cost (I)

The instrument cost was calculated according to the usage prescribed in CPG. It was the average cost of the sale price of the company. (Is the instrument reusable and so the cost should be shared per case over the service life of the instrument?)

1.3 The X-ray cost (X)

From the data of the department of radiology in June 25, 2005 (unpublished data), the X-ray cost was calculated according to the usage prescribed in CPG. (Is PACS being used to reduce film costs?)

1.4 The prosthesis cost (P)

In the arthroplasty subgroup, the prosthesis cost was the average cost of prosthesis in the sale price of the company.

1.5 Operating cost (O)

Using the formula $O = DC+IDC$

$= t_2\ (LC+CC)+MC+IDC$

DC = Direct cost per case
IDC = Indirect cost per case

t_2 = Operating time in hours
LC = Labor cost in hours
CC = Capital cost per hours
MC = Material cost per case

From the previous study in our department in 2002 (unpublished data), we adjusted by increasing the labor cost by 37% and the material cost by 12%.

1.6 The laboratory cost (L)

From the studies of the department of clinical pathology in March 13, 2006 (unpublished data) and department of microbiology in March 27, 2006 (unpublished data), the cost of laboratory use were collected and the cost was calculated directly from its usage according to CPG. The frequency or any necessary investigations were prescribed in detail in CPG.

1.7 The anesthetic cost (A)

Using the formula $A = 1{,}071\ t_3$

t_3 = Anesthetic time of the case (hours).

From the previous study of the department of anesthesiology in April 23, 2005 (unpublished data) the average anesthetic cost = 1,071 baht/hour.

1.8 The recovery room cost (R)

Using the formula $R = 645.27\ t_4$

t_4 = Time in recovery room (hours).

We studied in 3 recovery rooms using the SAP (System application products) software of the faculty (unpublished data), the cost = 645.27 baht/hour.

Part 2. The cost minimization analysis (CMA)

We divided the orthopaedic inpatients 12 orthopaedic diseases under the universal coverage policy which were admitted in Siriraj hospital into 2 groups. Group A, there were 236 cases which were studied from June 1, 2003 to February 24, 2005 (after UMOST). Group B, there were 89 cases which were studied from June 1, 2002 to May 31, 2003 (before UMOST). The cost analysis was performed by collecting all data including the medications and using the real length of stay of all cases. The cost of both groups were compared with the assumption that both groups had the same outcomes of treatment because of the same protocols of the treatment in the same group of patient and wards.

TABLE 1. The unit service cost of 12 orthopaedic disease using CPG.

12 Orthopaedic diseases	Operation	S = Service cost/case	I = Instrument cost/case	X = X-ray cost/case	P = Prosthetic cost/case	O = Operating cost/case	L = Laboratory cost/case	A = Anesthetic cost/case	R = Recovery room cost/case	t_1= The maximum length of stay (day)	C = Unit service cost
1	**Herniated nucleus pulposus**										
	1.1 Discectomy	18,442.60	-	214.76	-	7,890.85	191.63	2,441.88	967.91	10.00	30,149.63
	1.2 Microdiscectomy	18,442.60	16,206.88	214.76	-	10,749.59	191.63	2,495.43	967.91	10.00	49,268.79
2	**Femoral neck fracture**										
	2.1 Hemiarthroplasty										
	2.1.1 Bipolar 2 level with cemented	38,729.46	-	322.14	27,780.03	9,599.74	205.96	2,216.97	483.95	21.00	79,338.26
	2.1.2 Bipolar 2 level no cemented	38,729.46	-	322.14	43,859.81	9,599.74	205.96	2,216.97	483.95	21.00	95,418.04
	2.1.3 Bipolar (Austin Moore Prosthesis)	38,729.46	-	322.14	7,043.48	9,599.74	205.96	2,216.97	483.95	21.00	58,601.70
	2.2 Total hip replacement (THR), Total hip srthroplasty (THA)	38,729.46	-	322.14	44,324.20	12,254.01	205.96	3,213.00	483.95	21.00	99,532.73
	2.3 ORIF with DHS	38,729.46	7,304.35	322.14	-	13,554.77	205.96	2,495.43	483.95	21.00	63,096.06
	2.4 ORIF with mulitple										
	2.4.1 ORIF with mulitple cannulated screws	38,729.46	3,750.00	322.14	-	11,824.27	205.96	2,142.00	483.95	21.00	57,457.78
	2.4.2 ORIF with mulitple screws	38,729.46	1,050.00	322.14	-	11,824.27	205.96	2,142.00	483.95	21.00	54,757.78
3	**Spinal stenosis**										
	3.1 Decompressive Laminectomy	18,442.60	-	322.14	-	11,915.89	221.88	2,859.57	967.91	10.00	34,729.98
	3.2 Laminoplasty	18,442.60	-	322.14	-	16,478.17	221.88	4,284.00	967.91	10.00	40,716.69
	3.3 Fusion spine bone graft, Internal fixation, Thoracic thoracolumbar anterior										
	3.3.1 - Pedicle Screw (PDS) Titanium 1 level	18,442.60	33,271.03	322.14	-	13,018.46	221.88	3,213.00	967.91	10.00	69,457.00
	3.3.2 - Pedicle Screw (PDS) Titanium 2 level	18,442.60	47,725.86	322.14	-	13,018.46	221.88	3,213.00	967.91	10.00	83,911.83
	3.3.3 - Pedicle Screw (PDS) Titanium 3 level	18,442.60	62,196.26	322.14	-	13,018.46	221.88	3,213.00	967.91	10.00	98,382.24
	3.4 Fusion spine bone graft, Internal fixation, Thoracic thoracolumbar posterior										
	3.4.1 - Pedicle screw (PDS) Titanium 1 level	18,442.60	33,271.03	322.14	-	11,332.74	221.88	2,677.50	967.91	10.00	67,235.79
	3.4.2 - Pedicle screw (PDS) titanium 2 level	18,442.60	47,725.86	322.14	-	11,332.74	221.88	2,677.50	967.91	10.00	81,690.61
	3.4.3 - Pedicle screw (PDS) titanium 3 level	18,442.60	62,196.26	322.14	-	11,332.74	221.88	2,677.50	967.91	10.00	96,161.02
	3.5 Fusion spine bone graft, Internal fixation, Lumbar, Lumbosacral anterior										
	3.5.1 - Pedicle screw (PDS) Titanium 1 level	18,442.60	33,271.03	322.14	-	13,018.46	221.88	3,213.00	967.91	10.00	69,457.00
	3.5.2 - Pedicle screw (PDS) titanium 2 level	18,442.60	47,725.86	322.14	-	13,018.46	221.88	3,213.00	967.91	10.00	83,911.83
	3.5.3 - Pedicle screw (PDS) titanium 3 level	18,442.60	62,196.26	322.14	-	13,018.46	221.88	3,213.00	967.91	10.00	98,382.24
	3.6 Fusion spine bone graft, Internal fixation, Lumbar, Lumbosacral posterior										
	3.6.1 - Pedicle screw (PDS) titanium 1 level	18,442.60	33,271.03	322.14	-	11,915.89	221.88	2,859.57	967.91	10.00	68,001.00

12 Orthopaedic diseases	Operation	S = Service cost/case	I = Instrument cost/case	X = X-ray cost/case	P = Prosthetic cost/case	O = Operating cost/case	L = Laboratory cost/case	A = Anesthetic cost/case	R = Recovery room cost/case	t1= The maximum length of stay (day)	C = Unit service cost
	3.6.2 - Pedicle screw (PDS) titanium 2 level	18,442.60	47,725.86	322.14	-	11,915.89	221.88	2,859.57	967.91	10.00	82,455.83
	3.6.3 - Pedicle screw (PDS) titanium 3 level	18,442.60	62,196.26	322.14	-	11,915.89	221.88	2,859.57	967.91	10.00	96,926.24
4	**Cervical spondylosis**										
	4.1 Laminoplasty	18,442.60	19,000.00	214.76	-	16,478.17	221.62	4,284.00	967.91	10.00	59,609.05
	4.2 Anterior robinson fusion	18,442.60	-	214.76	-	12,411.38	221.62	3,030.93	967.91	10.00	35,289.19
5	**Osteoarthritis knee**										
	5.1 Total knee replacement (TKR), Total knee arthroplasty (TKA)	18,442.60	-	322.14	59,397.20	15,535.05	221.62	3,909.15	483.95	10.00	98,311.71
	5.2 High tibial osteotomy with plate & screw	18,442.60	-	322.14	5,000.00	14,446.24	221.62	2,677.50	483.95	10.00	41,594.05
6	**Avascular necrosis hip (AVN Hip)**										
	6.1 Total hip replacement (THR)	18,442.60	-	107.38	44,324.20	12,254.01	160.33	3,213.00	483.95	10.00	78,985.48
	6.2 Hemiarthroplasty	18,442.60	-	107.38	27,780.03	9,599.74	160.33	2,216.97	483.95	10.00	58,791.01
	6.3 Core decompression	18,442.60	-	107.38	-	11,226.57	160.33	1,606.50	483.95	10.00	32,027.34
7	**Anterior cruciate ligament (ACL) insufficiency**										
	7.1 Arthroscopy of knee use artificial ligament	9,221.30	-	322.14	24,000.00	8,382.08	118.49	1,424.43	483.95	5.00	43,952.40
	7.2 Arthroscopy of knee use autogous ligament										
	7.2.1 Repair cruciate ligament (Bone patella tendon bone : BPTB)	9,221.30	2,150.00	322.14	-	12,789.22	118.49	2,495.43	483.95	5.00	27,580.53
	7.2.2 Tendon graft (Hamstring graft)	9,221.30	4,486.96	322.14	-	13,430.80	118.49	2,677.50	483.95	5.00	30,741.14
8	**Femoral shaft fracture**										
	8.1 Closed femoral nailing	18,442.60	4,236.36	322.14	-	21,955.18	324.55	2,913.12	483.95	10.00	48,677.91
	8.2 Plating femur	18,442.60	2,152.98	322.14	-	10,513.28	324.55	1,874.25	483.95	10.00	34,113.76
9	**Brachial plexus injury**										
	9.1 Neurolysis spinal nerve root	5,532.78	-	107.38	-	10,851.82	118.49	1,338.75	967.91	3.00	18,917.13
	9.2 Neurotization, contralateral C_7 : Other anastomasis of cranial or peripheral nerve	5,532.78	-	107.38	-	16,870.16	118.49	2,859.57	967.91	3.00	26,456.29
	9.3 Neurotization,contralateral C_7 : Peripheral nerve graft	5,532.78	-	107.38	-	16,149.66	118.49	2,677.50	967.91	3.00	25,553.71
10	**Club foot**										
	10.1 Released Club Foot	5,532.78	210.00	-	-	7,661.70	-	2,409.75	967.91	3.00	16,782.13
	10.2 Tendon - archilis - lengthening (TAL)	5,532.78	-	-	-	5,110.99	-	1,424.43	967.91	3.00	13,036.10
11	**Osteosarcoma**										
	11.1 Amputation	16,598.34	-	214.76	-	6,053.64	4,318.35	1,788.57	967.91	9.00	29,941.56
	11.2 Biopsy	16,598.34	-	214.76	-	4,407.46	4,318.35	1,071.00	483.95	9.00	27,093.86
	11.3 Resection Tumor/ Curettage	16,598.34	-	214.76	-	9,202.30	4,318.35	1,606.50	483.95	9.00	32,424.20
	11.4 Resection tumor/ with autograft	16,598.34	-	214.76	-	20,387.92	4,318.35	3,748.50	967.91	9.00	46,235.78
12	**Chronic Osteomyelitis**										
	12.1 Sequestrectomy	18,442.60	-	107.38	-	10,264.31	3,398.73	1,606.50	483.95	10.00	34,303.48
	12.2 Debridement bone	18,442.60	-	107.38	-	10,264.31	3,398.73	1,606.50	483.95	10.00	34,303.48
	12.3 Remove of implant	18,442.60	-	107.38	-	10,264.31	3,398.73	1,606.50	483.95	10.00	34,303.48

TABLE 2. Cost minimization analysis before UMOST (group B) and after UMOST (group A).

12 Orthopaedic diseases	Average length of stay (LOS)		Service Cost (S)		The unit service cost of orthopaedic disease (C)			
	Group A	Group B	Group A	Group B	Group A	Group B	Increase after UMOST	Decrease after UMOST
1. Herniated Nucleus pulposus (plate)	9.17	8.50	16,911.86	15,676.21	29,757.84	29,241.24	516.60	
2. Femoral neck fracture (austin moore)	14.50	22.73	26,741.77	41,920.03	66,059.73	79,515.61		13,455.88
3. Spinal stenosis								
3.1 Use prosthesis	15.71	18.75	28,973.32	34,579.88	57,205.49	65,046.58		7,841.09
3.2 Without prosthesis	15.71	18.75	28,973.32	34,579.88	51,102.36	57,546.58		6,444.22
4. Cervical spondylosis								
4.1 Use prosthesis	15.40	17.25	28,401.60	31,813.49	57,159.94	61,058.20		3,898.26
4.2 Without prosthesis	15.40	17.25	28,401.60	31,813.49	50,784.94	54,533.20		3,748.26
5. Osteoarthritis knee (HTO)	11.86	12.87	21,872.92	23,735.63	78,101.75	81,290.39		3,188.64
6. AVN Hip								
6.1 THR/Hemiarthoplasty	10.50	12.60	19,364.73	23,237.68	61,570.53	59,541.23	2,029.30	
6.2 Decompression	10.50	12.60	19,364.73	23,237.68	61,752.45	59,723.90	2,028.55	
7. ACL Insufficiency								
7.1 Artificial ligament	5.05	5.38	9,313.51	9,922.12	29,610.17	32,689.65		3,079.48
7.2 Use autogous ligament	5.05	5.38	9,313.51	9,922.12	32,997.49	33,423.40		425.91
8. Femoral shaft fracture	11.00	10.25	20,286.86	18,903.67	53,204.56	50,023.93	3,180.62	
8.1 Closed femoral nailing								
8.2 Plating femur	11.00	10.25	20,286.86	18,903.67	40,723.79	37,543.16	3,180.62	
9. Brachial plexus injury	3.26	3.58	6,012.29	6,602.45	23,333.05	24,409.10		1,076.05
10. Club foot	2.75	6.33	5,071.72	11,674.17	17,696.70	24,166.00		6,469.31
11. Osteosarcoma	9.04	21.27	16,672.11	39,227.41	39,618.62	57,026.88		17,408.26
12. Chronic Osteomyelitis	19.86	17.62	36,627.00	32,495.86	75,103.20	62,678.94	12,424.27	
Average of all group	**9.48**	**11.55**						**3,274.45**

Note : Group A = after UMOST, Group B = before UMOST

RESULTS

Part 1: The unit service cost using CPG with maximum LOS (C) which was found is shown in Table 1, and the cost of 12 orthopaedic diseases are shown. It was the unit service cost and it could be changed following the 8 variables: S,I,X,P,O,L,A and R. If the real length of stay is less than the t1 (maximum LOS in CPG) the cost will be reduced by 1,844.26 baht/day of reduction. The club foot surgery which is 3 days maximum LOS had a minimum cost of 13,036.10 baht. The total hip replacement with 21 days maximum LOS had a maximum cost of 99,532.72 baht.

Taking the percentage of S,I,X,P,O,L,A,R in the unit service cost (C), there was the highest percentage in the service cost in the group without I cost and P cost (47.24%). In the group with only P cost, the instrument cost had the highest percentage (42.42%). In the group with only I cost the prosthetic cost had the highest percentage (43.32%). The S and O cost had the high percentage in the C cost in all groups.

Part 2: The cost minimization analysis (CMA). The brachial plexus injury was the most frequently operated in the 12 orthopaedic inpatients under universal coverage (37.29%). In Table 2, there are shown the length of stay and the cost before and after utilization management, The CMA was 3,274.45 baht/case. The average reduction in cost after utilization management occurred in 7 diseases, femoral neck fracture, spinal stenosis, cervical spondylosis, osteoarthritis, ACL insufficiency, brachial plexus injury, club foot and osteosarcoma. The average length of stay in group A was reduced by 2.07 day less than group B.

DISCUSSION

In part 1, the study of cost analysis, the cost of 12 orthopaedic diseases using the CPG in maximum LOS was between 13,036.10 baht/case in club foot surgery to 99,532.73 baht/case in THR surgery. The maximum length of stay prescribed in the CPG made the cost analysis higher than the usual cost analysis such as the 21 days of admission in THR which usually in this case the patient can be discharged within 10 days of admission. It should be called the maximum cost/case. The 1 day reduction in length of stay reduced the cost by 1,844.26 baht.

The cost reduction strategy can be planned in the future after this study by controlling the 8 variables of the cost analysis. Healy used the single price/case purchasing program and reduced the cost in 32% for hip implant.[14] He reduced the prosthetic cost in the S,I,X,P,O,L,A,R variables. The S,I,X,P,O,L,A,R had a meaning of its own and the reduction of the cost

TABLE 3. The comparison of cost between cost analysis using CPG and cost in group A after UMOST.

	12 Orthopaedic diseases under universal coverage	Cost analysis using CPG		Cost in group A		Average increase or (decrease) compared with group A	
		t_1	Average cost (Baht)	Average LOS (day)	Average cost (Baht)	In LOS (Baht)	In cost (Baht)
1	Herniated Nucleus pulposus (plate)	10	39,709.21	9.17	29,757.84	(0.83)	(9,951.37)
2	Femoral neck fracture (austin moore)	21	72,600.34	14.50	66,059.73	(6.50)	(6,540.60)
3	Spinal stenosis						
	3.1 Use prosthesis	10	82,997.72	15.71	57,205.49	5.71	(25,792.23)
	3.2 Without prosthesis	10	37,723.33	15.71	51,102.36	5.71	13,379.03
4	Cervical spondylosis						
	4.1 Use prosthesis	10	59,609.05	15.40	57,159.94	5.40	(2,449.11)
	4.2 Without prosthesis	10	35,289.19	15.40	50,784.94	5.40	15,495.75
5	Osteoarthritis knee (HTO)	10	69,952.88	11.86	78,101.75	1.86	8,148.87
6	AVN Hip						
	6.1 THR/Hemiarthoplasty	10	78,985.48	10.50	61,570.53	0.50	(17,414.95)
	6.2 Decompression	10	45,409.17	10.50	61,752.45	0.50	16,343.28
7	ACL Insufficiency						
	7.1 Artificial ligament	5	43,952.40	5.05	29,610.17	0.05	(14,342.23)
	7.2 Use autogous ligament	5	29,160.84	5.05	32,997.49	0.05	3,836.66
8	Femoral shaft fracture						
	8.1 Closed femoral nailing	10	48,677.91	11.00	53,204.56	1.00	4,526.65
	8.2 Plating Femur	10	34,113.76	11.00	40,723.79	1.00	6,610.03
9	Brachial plexus injury	3	23,642.38	3.26	23,333.05	0.26	(309.33)
10	Club foot	3	14,909.12	2.75	17,696.70	0.25	2,787.58
11	Osteosarcoma	9	33,923.85	9.04	39,618.62	0.04	5,694.77
12	Chronic Osteomyelitis	10	34,303.48	19.86	75,103.20	9.86	40,799.73

should be concentrated in this area such as the reduction in length of stay, in the price of prosthesis and instruments used in the investigation and in the operating room. The second meaning of S,I,X,P,O,L,A,R is in six cost centers: the first is the ward concerning the length of stay and, the second is the operating room concerning the O,A,R cost, the third is the company concerning the I and P cost, the fourth is the investigation centers concerning the X and L cost, the fifth is the physicians and the sixth is the policy maker and the payer. The six cost center provided us a simple way of thinking in dealing with the reduction of cost.

The result of cost minimization analysis showed that after utilization management in group A, it could reduce the cost of orthopaedic disease by a reduction of the utilization of resources and a reduction of the length of stay. The reduction of the utilization of the resources and the reduction of the unit cost of services and supplies has been successful in decreasing the hospital cost of orthopaedic operations and should be continued without disturbing the quality and standard of the treatment.

In Table 3, the comparison of cost between cost analysis using CPG in maximum length of stay and cost in group A after UMOST in 12 orthopaedic diseases under the universal coverage admitted to Siriraj Hospital is shown. The t_1 and average LOS were nearly equivalent except in the femoral neck fracture.

The reduction in average cost in group A after UMOST came from the cooperation of physicians and nurses in reducing the utilization of the resources even though the cost analysis in group A included the drugs prescribed for the patients which made its cost higher in some diseases.

CONCLUSION

The cost analysis using CPG in the maximum length of stay was done and the CMA was performed with the reduction n of cost by 3,274.45 baht/case and 2.07 days of length of stay in group A with utilization management.

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