

CHAPTER 4

RESULTS



4.1 Health provider's cost

1. Direct & Indirect cost

Table 4.1-4.6 show how the cost of health provider in diagnosis of gestational diabetes was calculated. The tables show about the detail of the labor cost, material cost and capital cost, that correspond to the patient service (PS), revenue producing cost center (RPCC), non revenue producing cost center (NRPCC) and the criteria to allocated cost to each component.

Table 4.1 Antenatal care

	number	cost per unit	total cost	allocated cost
Office equipments	17	2,870.00	48,790.00	1,605.18
Patient bench	18	2,500.00	45,000.00	1,480.49
Weigh meter	1	20,000.00	20,000.00	9.87
Computer table	3	2,800.00	8,400.00	276.36
Computer	3	25,000.00	75,000.00	74.02
Pelvic exam. bed	1	7,500.00	7,500.00	246.75
Patient exam. bed	9	2,000.00	18,000.00	592.20
Air conditioner	9	44,500.00	400,500.00	395.29
Computer maintenance	7	750.00	5,250.00	44.41
Water			15,846.30	134.06
Electricity			104,614.14	885.03
Labor			7,893,538.80	66,778.81
Urine strip	519	2.60	1,349.40	1,349.40
Area rent	317.07	1,656.26	525,150.36	2,591.60
Total				76,463.46

This table shows the cost of health provider in antenatal care unit. During the period of the study, 61,348 out-patient visits took place and 519 visits (224 patients) were the proportion of the studied group.

The labor cost (LC) comprised of salary and fringe benefits were collected from 1 June – 31 December 2003 and then allocated by the proportion of the number of studied group to the number of the total out-patient visits (519 / 61348).

The material cost (MC) comprised of electricity, water and urine strip were calculated by their own meter and the number used then allocated in the same way as the labor cost.

The capital cost (CC) comprised of office equipments, weigh meter, computer work stations, examination beds, pelvic examination bed, air conditioners were calculated as the value of depreciation that correspond to the recommendation of "Estimated Useful Lives of Depreciable Hospital Assets" (1978 Edition by The American Hospital Association). Then allocated by the proportion of time of study (7/ 12 year) and the proportion of the number of the visits in the same way as the labor cost. The capital cost of the building were calculated as the rent for the area (the rent is equal to 1,656.26 baht per square meter per year : The Co-Op Savings of Vajira Hospital 2003) of the antenatal care unit and then allocated by the time and the number of visits as the labor cost.

The total allocated cost from the antenatal care unit was equal to 76,463.46 baht.

Table 4.2 Pharmacy and Financial unit

	number	cost per unit	total cost	allocated cost
Office equip.	2	2,870.00	5,740.00	197.98
Com. table	4	2,800.00	11,200.00	386.30
Computer	4	25,000.00	100,000.00	103.47
Drug cabinet 1	2	4,500.00	9,000.00	310.42
Drug cabinet 2	3	6,600.00	19,800.00	682.92
Refrigerator	1	6,500.00	6,500.00	3.36
Air conditioner	3	44,500.00	133,500.00	138.14
Com. mainten.	7	750.00	5,250.00	0.42
Water			15,846.30	140.54
Electricity			20,922.81	185.57
Glucose (50 gm.)		4.80		
Glucose (100 gm.)		9.60		
Blood test set		6.05		
Labor			557,854.21	4,947.68
Area rent	44.53	1,656.26	73,753.26	2,886.15
Total				9,982.95

This table shows the cost of health provider in pharmacy and financial unit. During the period of the study, total of 106,502 prescribed drug lists took place which comprised of 33,952 out-patient and 72,550 in-patient drug list. The average lists of out-patient and in-patient were 1.82 and 3.06 lists per prescription respectively. The estimated number of prescribed drug list of the studied group (519 visits) was equal to 944. 58 (from 519 x1.82).

The labor cost (LC) comprised of salary and fringe benefits were collected from 1 June – 31 December 2003 and then allocated by the proportion of the number of prescribed drug list in the studied group to the number of the total prescribed drug lists (944.58 / 106,502).

The material cost (MC) comprised of electricity, water, sugar and blood test set were calculated by their own meter then allocated in the same way as the labor cost.

The capital cost (CC) comprised of office equipments, refrigerator, computer work stations, drug cabinet, air conditioners were calculated as the value of depreciation that correspond to the recommendation of "Estimated Useful Lives of Depreciable Hospital Assets" (1978 Edition by The American Hospital Association). Then allocated by the proportion of time of study (7/12 year) and the proportion of the number of prescribed drug list in the same way as the labor cost. The capital cost of the building were calculated as the rent for the area (the rent is equal to 1,656.26 baht per square meter per year : The Co-Op Savings of Vajira Hospital 2003) of the pharmacy and financial unit and then allocated by the time and the number of prescribed drug list as the labor cost.

The total allocated cost from the pharmacy and financial unit was equal to 9,982.95 baht.

Table 4.3 Medical Record

	number	cost per unit	total cost	allocated cost
Office equipment	4	2,870.00	11,480.00	377.69
Com. table	6	2,800.00	16,800.00	552.72
Computer	6	25,000.00	150,000.00	148.05
Record cabinet	3	32,000.00	96,000.00	3,158.38
Printer	4	42,000.00	168,000.00	165.81
Air conditioner	2	44,500.00	89,000.00	87.84
Com. maintenance	7	1,500.00	10,500.00	88.83
Water			3,169.26	26.81
Electricity			20,922.81	177.01
Labor			360,972.00	3,053.80
Area rent	56	1,656.26	92,750.56	457.72
Total				7,836.93

This table shows the cost of health provider in medical record subunit. During the period of the study, 61,348 out-patient visits were took place and 519 visits (224 patients) were the proportion of the studied group.

The labor cost (LC) comprised of salary and fringe benefits were collected from 1 June – 31 December 2003 and then allocated by the proportion of the number of studied group to the number of the total out-patient visits (519 / 61348).

The material cost (MC) comprised of electricity, water and were calculated by their own meter and then allocated in the same way as the labor cost.

The capital cost (CC) comprised of office equipments, computer work stations, printer, record cabinet, air conditioners were calculated as the value of depreciation that correspond to the recommendation of " Estimated Useful Lives of Depreciable Hospital Assets" (1978 Edition by The American Hospital Association). Then allocated by the proportion of time of study (7/ 12 year) and the proportion of the number of the visits in the same way as the labor cost. The capital cost of the building were calculated as the rent for the area (the rent is equal to 1656.26 baht per square meter per year : The Co-Op Savings of Vajira Hospital 2003) of the medical record subunit and then allocated by the time and the number of visits as the labor cost.

The total allocated cost from the medical record subunit was equal to 7,836. 93 baht.

Table 4.4 Central Laboratory

	number	cost per unit	total cost	allocated cost
Office equip.	12	2,870.00	34,440.00	2,432.17
Com. table	4	2,800.00	11,200.00	790.95
Computer	4	25,000.00	100,000.00	210.61
Analyzer1	1	3,900,000.00	3,900,000.00	5,164.13
Analyzer2	1	3,660,000.00	3,660,000.00	4,846.34
Analyzer3	1	2,695,000.00	2,695,000.00	3,568.55
Analyzer4	1	3,700,000.00	3,700,000.00	4,899.30
Patient table set	2	2,870.00	5,740.00	405.36
Centrifugator1	1	99,500.00	99,500.00	105.40
Centrifugator2	1	184,040.00	184,040.00	194.96
Air conditioner	4	44,500.00	178,000.00	377.11
Com. maintenance	7	1,000.00	7,000.00	127.12
Water			12,677.04	230.21
Electricity			55,318.25	1,004.56
Labor			3,266,092.00	59,310.83
Reagent		12.54		
Area rent	140	1,656.26	231,876.40	2,456.29
Total				83,691.71

This table shows the cost of health provider in central laboratory unit. During the period of the study, total of 46,587 blood sugar test were took place which comprised of 846 blood sugar test were the proportion of the studied group.

The labor cost (LC) comprised of salary and fringe benefits were collected from 1 June – 31 December 2003 and then allocated by the proportion of the number of blood sugar test of the studied group to the number of the total blood sugar test (846 / 46,587).

The material cost (MC) comprised of electricity, water, sugar and reagent were calculated by their own meter and the number used then allocated in the same way as the labor cost.

The capital cost (CC) comprised of office equipments, computer work stations, analyzer, centrifugator, air conditioners were calculated as the value of depreciation that correspond to the recommendation of " Estimated Useful Lives of Depreciable Hospital Assets" (1978 Edition by The American Hospital Association). Then allocated by the proportion of time of study (7/ 12 year) and the proportion of the number of blood sugar test of the studied group to the number of the total blood sugar test in the same way as the labor cost. The capital cost of the building were calculated as the rent for the area (the rent is equal to 1656.26 baht per square meter per year : The Co-Op Savings of Vajira Hospital 2003) of the central laboratory unit and then allocated by the time and the number of blood sugar test as the labor cost.

The total allocated cost from the central laboratory unit was equal to 83,691.71 baht.

Table 4.5 NRPC

	LC	MC+CC	IDC	total cost	allocated cost
Medical record			1,991,863.45	1,991,863.45	904.55
Diagnosis and treatment			54,909,880.67	54,909,880.67	24,935.95
Central laboratory			3,241,293.10	3,241,293.10	905.82
Pharmacy			3,110,051.17	3,110,051.17	1,358.03
Laundry	3,661,287.12		1,050,979.82	4,712,266.93	1,920.48
Financial			2,324,796.92	2,324,796.92	1,082.82
Medical supply	11,369,764.84		3,263,713.82	14,633,478.66	1,277.97
Material	6,900,901.31		1,980,917.58	8,881,818.89	1,551.33
Personal	8,093,010.92		2,323,115.03	10,416,125.95	909.66
General management	12,951,085.54		3,717,635.11	16,668,720.65	1,940.94
Monetary and Budget	8,004,839.51		2,297,805.25	10,302,644.76	2,399.33
Administration	4,972,092.64	306,844.00	1,427,249.17	6,706,185.81	1,561.77
Maintenance	13,475,105.34		3,868,056.04	17,343,161.38	3,029.22
Training	4,115,610.86		1,181,394.36	5,297,005.23	925.19
Information Technology	2,714,460.36		779,191.30	3,493,651.66	1,387.79
Security	73,650,533.86	700,791.42	21,141,533.60	95,492,858.88	976.34
Total					47,067.18

This table showed the cost of health provider in non revenue producing cost center. In this study, the unit cost data of BMA Medical College and Vajira Hospital in the year 2001 were used as the baseline data. The cost data of LC, MC, CC of Medical record, Diagnosis and treatment, Central laboratory, Pharmacy, and Financial were collected directly as shown in table 4.1-4.4, so this part the data used would be the indirect cost (IDC) only. The other components that the studied group had the relationship with such as Administration, General management, Security, etc were included by their LC, MC, CC and IDC data. In the unit cost data of BMA Medical

College and Vajira Hospital in the year 2001, there were many products such as out-patient, in-patient, research, etc. The criteria to allocated these cost to each products is on basis of time used as the same for LC (which were received by questionnaire). The total allocated cost were shown in table 4.5

The total allocated cost from the non revenue producing cost center group was equal to 47,067.18 baht. The consumer price index (CPI) in the year 2001, 2002, 2003 are equal to 103.5,104.2,104.2 respectively when the year 1998 is the based year (CPI 100) : Bureau of Trade and Economic indices (Ministry of Commerce). The total allocated cost were modified by the inflation rate to be the cost in 2003. The modified cost was equal to 47,395.65 baht ($47,067.18 \times 1.007^2$)

Table 4.6 Total direct & indirect cost

Antenatal care	76,463.46
Pharmacy and financial	9,982.95
Medical record	7,836.93
Central laboratory	83,691.71
NRPCC	47,396.65
Total	225,371.70

This table show the total allocated cost from three groups of cost center, patient service (PS), revenue producing cost center (RPCC), and non revenue producing cost center (NRPCC). In the studied group there were 846 blood samplings. So, the cost of each blood sample is equal to 266.40 baht ($225,371.70 / 846$).

The operation cost comprised of

1. glucose 50 gm. 4.80 baht
2. glucose 100 gm. 9.60 baht
3. blood sampling set 6.50 baht
4. reagent 12.54 baht

The cost of 50 gm. glucose challenge test (GCT) is equal to
290.24 baht (266.40+4.80+6.50+12.54).

The cost of 100 gm. oral glucose tolerance test (GTT)is equal to
1151.36 baht (9.60 + 4x(266.40+6.50+12.54)).

Table 4.7 Age and obesity by BMI of studied group (224 cases)

age	Interval (yrs.)	No.	percentage
	≤ 20	23	10.27
	21-30	84	37.50
	31-40	106	47.32
	≥ 41	11	4.91
BMI	value of BMI (kg./ m. ^2)	No.	percentage
non-obesity	<29	166	74.11
obesity	≥29	58	25.89

This table showed details of the important risk factors of gestational diabetes in the studied group. The major proportion of the studied group aged 21-40 years old. (84.82 %), and non-obesity (BMI <29(kg./ m. ^2)) (74.11%).

Table 4.8 Comparison of age and BMI in GDM and non GDM

age	mean (yrs.)	standard deviation	p-value	95%CI
GDM	32.47	6.30	0.018	0.49 - 5.17
non GDM	29.69	6.41		
BMI	mean(kg./ m. ^2)	standard deviation	p-value	95%CI
GDM	28.29	6.03	0.725	-8.55 - 5.96
non GDM	26.99	21.90		

This table showed that gestational diabetes and non gestational diabetes are not different in age and obesity.

Table 4.9 the number GCT and GTT in both groups in diagnosis of gestational diabetes.

	GCT	GTT
*ADA	225	31
**BMA	410	109

* ADA American Diabetic Association Recommendation

** BMA BMA Medical college and Vajira Hospital Practical Guideline

The number of the patients in this study is 224 patients. Gestational diabetes cases were found by American Diabetic Association Recommendation and BMA Medical college and Vajira Hospital Practical Guideline were 30 and 36 cases respectively (prevalence 13.39% and 16.07%).

The cost of test in American Diabetic Association Recommendation were 100,996.16 baht ($225 \times 290.24 + 31 \times 1151.36$) and BMA Medical college and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes were 244,496.44 baht ($410 \times 290.24 + 109 \times 1151.36$).

2. Future cost

From the Master thesis in health economics in 1998 (Sakthong P, 1998). The study was about the cost of kidney disease from diabetes by comparing between no drug therapy (only cost of hemodialysis) and drug therapy (cost of ACE inhibitor and hemodialysis). The scenario of the kidney disease was begin as the early stage to the last stage:

(microalbuminuria – macroalbuminuria-ESRD-death).

Table 4.10 Table of cohort simulation for No drug Therapy as below (100 patients)

Stage	micro	macro	ESRD	death
Cycle 0	1.00	0.00	0.00	0.00
1	0.86	0.12	0.00	0.02
2	0.74	0.22	0.01	0.03
3	0.64	0.29	0.01	0.06
4	0.55	0.34	0.02	0.09
5	0.48	0.37	0.03	0.12
6	0.41	0.39	0.04	0.16
7	0.35	0.40	0.04	0.20
8	0.31	0.41	0.05	0.24
9	0.26	0.40	0.05	0.28
10	0.23	0.39	0.05	0.33
11	0.20	0.38	0.05	0.37
12	0.17	0.37	0.05	0.41
13	0.15	0.35	0.05	0.45
14	0.13	0.33	0.05	0.49
15	0.11	0.32	0.05	0.52
16	0.09	0.30	0.05	0.56
17	0.08	0.26	0.04	0.60
18	0.07	0.26	0.04	0.63
19	0.06	0.24	0.04	0.66
20	0.05	0.23	0.04	0.69
21	0.04	0.21	0.03	0.71
22	0.04	0.19	0.03	0.74
23	0.03	0.18	0.03	0.76
24	0.03	0.17	0.03	0.78
25	0.02	0.15	0.03	0.80

In 25 years, the patients in ESRD stage were 91 patients. The standard of hemodialysis recommended by nephrologist association was 2 times per week. Total hemodialysis of cohort group in 25 years were 9,464 times (52x2x91). By average a person had hemodialysis 94.64 times(9,464/100). By using the cost of hemodialysis for ESRD (in health provider's perspective) from King Chulalongkorn Memorial Hospital (Kamolratanakul et al, 2001) 3,880.01 baht per time. The hemodialysis cost will be 367,204.15 baht (94.64 x 3,880.01) per person.

Gestational diabetes after follow up, 50 % of them will progress to overt diabetes in the future (Cunningham FG et al, 2001),The early asymptomatic stage of kidney disease called "microalbuminuria" has been already presented in this diabetes group 20% since then (Wass JAH et al, 2002).

In this study, the undiagnosed diabetes cases from American Diabetic Association Recommendation were 6 cases. The hemodialysis cost will be 220,322.49 baht (6x50%x20% x 367,204.15). When concern with the inflation rate by consider customer price index from 2001– 2003, it shown 103.5, 104. 2, 104. 2 respectively : Bureau of Trade and Economic indices (Ministry of Commerce) . The future cost as the medical cost for hemodialysis in 2003 will be 221,864.74 baht (220,322.49 x1.007x1.0).

4.2 Patient's cost

1. Cost of diagnosis and treatment of gestational diabetes

1.1 Cost of diagnosis of gestational diabetes

The price of GCT and GTT that BMA Medical College and Vajira Hospital charged from the patients were 30 and 120 baht respectively. So American Diabetic Association Recommendation and BMA Medical college and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes will be

10,470 baht $((225 \times 30) + (31 \times 120))$ and 25,380 baht $((410 \times 30) + 109 \times 120)$ respectively.

1.2 Cost of treatment of gestational diabetes

Supposed the gestational diabetes woman was received insulin treatment 5 international unit (IU) / day. Insulin that used was Mixtard 30HM[®], and the price was 1.70 baht / 5 IU.. The insulin injection equipment price was 4.25 baht / set. Supposed in American Diabetic Association Recommendation program, the diagnosis were done at 28 weeks of pregnancy, and every patient give birth at 40 weeks of pregnancy, then insulin treatment for gestational diabetes in this program will be 84 days. $((40 - 28) \times 7)$. Similarly, supposed in BMA Medical College and Vajira Hospital Practical Guideline program, the diagnosis were done at 28 and 32 weeks of pregnancy, and every patient give birth at 40 weeks of pregnancy, then insulin treatment for gestational diabetes will be partly the same as American Diabetic Association Recommendation program (84 days) plus the other part which diagnosis later at 32 weeks that will be 56 days $((40 - 8) \times 7)$.

From the assumption above:

The Patients' cost (30 cases) for treatment of gestational diabetes in American Diabetic Association Recommendation program were 14,994 baht $(30 \times 84 \times (1.70 + 4.25))$.

The patients' cost (36 cases) for treatment of gestational diabetes in BMA Medical college and Vajira Hospital Practical Guideline program were 16,993.20 baht $(30 \times 84 \times (1.70 + 4.25)) + (6 \times 56 \times (1.70 + 4.25))$.

1.3 Transportation cost for test of gestational diabetes.

Supposed the patients go to the hospital by single-line bus, at present the bus fare is 3.50 baht / trip. So, forth and back will be 7 baht.

The patients' transportation cost of American Diabetic Association Recommendation program will be 1,792 baht $((225+31) \times 7)$.

The patients' transportation cost of BMA Medical college and Vajira Hospital Practical Guideline program will be 3,633 baht $((410+109) \times 7)$.

1.4 Productivity loss for test of gestational diabetes.

The minimum wage in Bangkok (2003) is 170 baht per day (Ministry of Labor).

The productivity loss of American Diabetic Association Recommendation program will be 43,520 baht $((225+31) \times 170)$.

The productivity loss of BMA Medical college and Vajira Hospital Practical Guideline program will be 88,230 baht $((410+109) \times 170)$.

2. Opportunity cost of patient.

2.1 Cost of treatment of macrosomia with hypoglycemia.

The incidence of macrosomia (birth weight above 4000 g) was 50% of pregnancies complicated by gestational diabetes and 10 times occurred more often in diabetic women when compared with a nondiabetic control population (Baron et al, 2002). Magee and co-workers reported that 4% of infants of women with gestational diabetes required intravenous glucose therapy for hypoglycemia (Cunningham FG et al, 2001). The number of macrosomia with hypoglycemia from the undiagnosed gestational diabetes cases from American Diabetes Association Recommendation will be 0.12 case $(6 \times 50\% \times 4\%)$.

To calculate cost of treatment, using the disease related group (DRG) version 3. When input the data to calculated the cost for treatment as follow in the program:

age of patient	1 day.
weight	4,000 gms.
length of stay	3 days. (expert' s opinion)
disease group	P 701 (maternal diabetes)

The result received 15,541 with relative corrected weight 0.3927

The cost in treatment was 732.35 baht ($15,541 \times 0.3927 \times 0.12$).

The opportunity cost of the patients which diagnosis of gestational diabetes were made and received optimal treatment would have the incidence of macrosomia and hypoglycemia less 10 times (Baron et al, 2002) , then the number of treatment would changed to 0.012 case ($6 \times 5\% \times 4\%$). The cost in treatment was 73.25 baht ($15,541 \times 0.3927 \times 0.012$).

2.2 Cost of kidney disease of the undiagnosed gestational diabetes cases.

The cost are comprised of

Direct cost	medical cost	hemodialysis of end stage renal disease(ESRD)
	non medical cost	transportation
Indirect cost		productivity loss

2.2.1 Cost of hemodialysis of ESRD.

Gestational diabetes after follow up, 50 % of them will progress to overt diabetes in the future (Cunningham FG et al, 2001) ,The early asymptomatic stage of kidney disease called "microalbuminuria" has been already presented in this diabetes group 20% since then (Wass JAH et al,2002).



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From the Master thesis in health economics in 1998(Sakthong P,1998). The study was about the cost of kidney disease from diabetes by comparing between no drug therapy (only cost of hemodialysis) and drug therapy (cost of ACE inhibitor and hemodialysis) . The scenario of the kidney disease was begin as the early stage to the last stage:

(microalbuminuria – macroalbuminuria-ESRD-death).

By using Markov 's model to determine the possibility of each event and study a cohort group of diabetes with microalbuminuria (100 patients) resulted in that the discounted lifetime medical cost was 148,481.85 baht per person.

In this study, the undiagnosed diabetes cases from American Diabetic Association Recommendation were 6 cases. The medical cost will be 89,089.11 baht ($6 \times 50\% \times 20\% \times 148,481.85$). When concern with the inflation rate by consider customer price index from 1998 – 2003, it shown 100, 100.4, 101.9, 103.5, 104. 2, 104. 2 respectively : Bureau of Trade and Economic indices (Ministry of Commerce) . The medical cost in 2003 will be 92,885.42 baht ($89,089.11 \times 1.004 \times 1.015 \times 1.016 \times 1.007 \times 1.0$).

2.2.2 Transportation cost for hemodialysis.

From Table 4.10; in 25 years, the patients in ESRD stage were 91 patients. The standard of hemodialysis recommended by nephrologist association was 2 times per week. Total hemodialysis of cohort group in 25 years were 9,464 times ($52 \times 2 \times 91$).

Supposed the patients go to the hospital by single-line bus, at present the bus fare is 3.50 baht. For forth and back trip the cost of transportation for hemodialysis will be 7.00 baht. The cost of the transportation of the cohort group were 66,248 baht (9,464x7) or average 662.48 baht per person.

In this study, the undiagnosed diabetes cases from American Diabetic Association Recommendation were 6 cases. The transportation cost will be 397.49 baht (6x50%x20%x662.48).

2.2.3 Productivity loss from shortened life span.

From the Master thesis in health economics in 1998(Sakthong P,1998).

Under no drug therapy, Markov model predicted the cohort group began from 44 years of age that the life expectancy 14.30 years for one patient, thus survival to age 58 on average. Under the drug therapy, Markov model predicted that the life expectancy 19.39 years for one patient , survival to age 63 on average. So the undiagnosed diabetes cases shortened their live span 5 years (63-58) on average.

The minimum wage in Bangkok (2003) is 170 baht per day (Ministry of Labor). The productivity loss of undiagnosed diabetes cases from American Diabetic Association Recommendation were 186,150 baht (6x50%x20%x365x5x170).

2.2.4 Role of Angiotensin Converting Enzyme(ACE) Inhibitors in patient 's cost.

ACE inhibitor is a hypotensive drug using in delaying progression of kidney disease in diabetic patient with microalbuminuria. From the Master thesis in health economics in 1998(Sakthong P,1998); in drug therapy, Markov model predicted that the life expectancy 19.39 years for one patient , survival to age 63 on average, 5 years longer life span more than no drug therapy. The discounted lifetime costs of drug treatment(including treatment of kidney complication) was 104,143.87 baht per person. Which consisted of drug cost 48,944.58 baht and hemodialysis cost 55,199.29 baht. The cost of ACE inhibitor at that time 7.26 baht per tablet. Now, the drug price decreases to 0.40 baht per tablet, thus total cost of drug will decrease to 2,696.67 baht ($48,944.58 \times 0.4/7.26$).

The medical cost for hemodialysis for drug therapy group was 55,199.29 baht per person. In this study, the undiagnosed diabetes cases from American Diabetic Association Recommendation were 6 cases. The medical cost will be 33,119.57 baht ($6 \times 50\% \times 20\% \times 55,199.29$) and modified by inflation rate this amount in 2003 will be 34,530.88 baht ($33,119.57 \times 1.004 \times 1.015 \times 1.016 \times 1.007 \times 1.0$).

The transportation cost can be calculated in the same way as in 2.2.2 In 25 years, the patients in ESRD stage with drug therapy were 39 patients. The standard of hemodialysis recommended by nephrologist association was 2 times per week. Total hemodialysis of cohort group in 25 years were 4,056 times ($52 \times 2 \times 39$). The cost of the transportation of the cohort group were 28,392 baht ($40,56 \times 7$) or average 283.92 baht per person. In this study, the undiagnosed diabetes cases from American Diabetic Association Recommendation were 6 cases. The transportation cost will be 170.35 baht ($6 \times 50\% \times 20\% \times 283.92$).

4.3 The effectiveness

Table 4.11 The effectiveness (number of correctly diagnosis of gestational diabetes) of each program.

	Non gestational diabetes	Gestational diabetes
ADA	194	30
BMA	188	36

The number of the patients in this study is 224 patients. Gestational diabetes cases were found by American Diabetic Association Recommendation and BMA Medical college and Vajira Hospital Practical Guideline were 30 and 36 cases respectively (prevalence 13.39% and 16.07%).

4.4 Cost-effectiveness and incremental cost-effectiveness ratio of each program in health provider's and patient's perspective.

Table 4.12 Health provider' s perspective

	ADA	BMA
Cost of test for GDM	100,996.16	244,496.44
Future cost of hemodialysis for the undiagnosed GDM	221,864.74	-
Total cost (C)	322,860.90	244,496.44
Effectiveness (No. correctly diagnosed cases (E))	30	36
C / E (baht per case)	10,762.03	6,791.57

ICER = -13,060.74 baht per case $((244,496.44 - 322,860.90) / (36 - 30))$.

Table 4.13 Patient's perspective

	ADA	BMA
Direct cost		
Diagnosis test	10,470.00	25,380.00
Transportation for test	1,792.00	3,633.00
Productivity loss for test	43,520.00	88,230.00
Indirect & Opportunity Cost		
Treatment macrosomia with hypoglycemia	732.25	73.25
Hemodialysis	92,885.42	34,530.00
Transportation for dialysis	397.49	170.35
Productivity loss from shortened life	186,150.00	-
ACE inhibitor	-	2,696.67
Insulin treatment	-	1,999.20
Total cost (C)	333,947.26	156,714.23
Effectiveness (No. correctly diagnosed cases (E))	30	36
C / E (baht per case)	11,198.24	4,353.15

ICER -29,538.84 baht per case $((156,714.23 - 333,947.26) / (36 - 30))$.

4.5 Additional cost (for additional GDM cases) and Opportunity cost (for undiagnosed GDM cases).

Table 4.14 Comparison of Additional and opportunity cost

	Additional cost		Opportunity cost
	Health provider	Patient	
Diagnosis test (Δ)	143,500.28	-	-
Treatment macrosomia with hypoglycemia	-	73.25	732.35
Hemodialysis	-	34,530.88	92,885.42
Transportation for dialysis	-	170.35	397.49
Productivity loss from shortened life span	-	-	186,150.00
ACE inhibitor	-	2,696.67	-
Insulin treatment	-	1,999.20	-
Subtotal	143,500.28	39,470.35	
Total cost (C)	182,970.63		280,168.26

In this study the additional cost of the additional cases in diagnosis of gestational diabetes by BMA Medical College and Vajira Hospital Practical Guideline was 182,970.63 baht . When compared to the opportunity cost of the undiagnosed cases of gestational diabetes which was 280,168.26 baht, so 97,197.63 baht (280,168.26-182,970.63) was preserved.