CHAPTER 5

DISCUSSIONS AND CONCLUSIONS

Diabetes is the most common medical complication of pregnancy. Patients can be separated into those who were known to have diabetes before pregnancy (overt) and those diagnosed during pregnancy (gestational). It is estimated that 90% of all pregnancies complicated by diabetes are due to gestational diabetes. Diabetes is classified as type 1 (insulin dependent) or type 2 (noninsulin dependent) according to whether the patient requires exogenous insulin to prevent elevated ketone level in blood. Catalano and colleagues (1999) found that women with gestational diabetes had abnormalities in glucose metabolism that are hallmarks of type 2 diabetes. Importantly, half of women with gestation diabetes ultimately develop overt diabetes in the ensuing 20 years, and there is mounting evidence for long-range complications that impacted maternal and fetal health. The purpose of this study is to assess the cost-effectiveness of BMA Medical College and Vajira Hospital Practical Guideline and American Diabetic Association Recommendation in diagnosis of gestational diabetes. Moreover,
compare the additional cost of BMA Medical College and Vajira Hospital's Practical Guideiine to the patient's opportunity cost of the undiagnosed cased by American Diabetic Association Recommendation.

This chapter is divided into four sections: discussions, policy implications, recommendations of further studies, and conclusions.

5.1 Discussions

The prevalence of gestational diabetes vary between population. The main determinant is the age of onset and frequency of type 2 diabetes in a given ethnic group

of females in a particular environment. Obesity, exercise and maternal age are also important. The prevalence ranges from 0.5% – 20 %(Wass JAH et al, 2002). In this study, the prevalence of gestational diabetes was found by American Diabetic Association Recommendation and BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes were 13.39 % and 16.07% respectively as shown in Table 4.11. This result is comparable with the study by Soonthornpun and colleagues (2003) at Songkla Thailand. In that study, the prevalence by using Carpenter and Coustan criteria in diagnosis of gestational diabetes was 21.4% which is usually 54%(Cunningham FG et al , 2001) higher than National Diabetic Group (1979) as in this study. So, the corrected prevalence was 13.9 %.

In gestational diabetic group, mean age was higher than in non diabetic group (32.47 years compared with 29.69 years old), but no statistically significant when look at the 95% CI that include 1 value (Table 4.8). In obesity risk factor, there was no different similarly between gestational diabetes and non gestational diabetes as shown in Table 4.7, 4.8. The studied group comprised of major part in non obesity (BMI <29) 74.11% may be one of the explanations.

By BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes, 36 cases of gestational diabetes were found; an additional of 6 cases more than using American Diabetic Association Recommendation. False negative rate by American Diabetic Association Recommendation in this study was 16.66% (6/36).The screening test by 50 glucose challenge test by using the value140 mg.% or higher will identify 80% (false negative 20%)of all women with gestational diabetes (Cunningham FG et al , 2001) resulted nearly the same. One of the additional 6 cases were the case that had one abnormal oral glucose tolerance test (GTT) found firstly at 24 weeks of pregnancy test, and when 34 weeks of pregnancy; the test value

fulfilled the criteria of gestational diabetes, the other five cases were missed by GCT. The lower level of criteria of abnormal screening at 130 mg% may improved efficiency of American Diabetic Association Recommendation in diagnosis of gestational diabetes. In literature claimed that at this level will increase the yield to over 90 percent (Cunningham FG et al , 2001).

In calculation the cost for diagnosis of gestational diabetes, comprised of many components of cost that were the controversial issues such as regimen of diagnosis that consisted of glucose quantity, time for blood sugar evaluation post glucose ingestion, criteria of positive test etc, the others are labor cost, material cost, capital cost, that may be different between the nation globally and the last two issues were exchange rate and inflation rate that seems to be very hard to compare. In Thailand, this is the first study in cost-effective between two program : BMA Medical College and Vajira Hospital Practical Guideline and American Diabetic Association Recommendation in diagnosis of gestational diabetes.

Heath provider 's cost of test in diagnosis of gestational diabetes in 224 patients in the study period comprised of the number of GCT and GTT in each program as shown in Table 4.9. Total of 36 cases were diagnosis of gestational diabetes; which six of them were the false negative cases by American Diabetic Association Recommendation. By assumption that these undiagnosed cases will have long term complication as ESRD and come to receive medical care(hemodialysis) from the same health provider. Then the cost in the future should be included in the health provider's cost for cost-effectiveness analysis (Gold et al,1996) as shown in Table 4.12. Total cost and cost-effectiveness in health provider's (Table 4.12) and patient's (Table 4.13) perspective of BMA Medical College and Vajira Hospital Practical Guideline 244,496.44 baht (6,791.57 baht per case) and 156,714.23 baht (4,353.15 baht per case) compared

to the American Diabetic Association Recommendation was 322,860.90 baht (10,762.03 baht per case) and 333,947.26 baht (11,198.24 baht per case) respectively. So, the additional cost for the additional diagnosed cases in health provider's and patient's perspective were -13,060.74   and –29,538.84 baht per case similarly. The cost per case both in health provider's and patient's perspective from BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes were cheaper than American Diabetic Association Recommendation (6,791.57 VS 10,762.03 baht per case and   4,353.15 VS 11,198.24 baht per case); so, it was more efficient than American Diabetic Association Recommendation. The ICER   showed negative value in both health provider's and patient's perspective (-13,060.74   and –29,538.84 baht per case) meant that it was cost saving in additional cases.

The additional cost as shown in table 4.14 , the extra cost from BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes, were the cost of the current situation in management of the additional discovered gestational diabetes with the objective that trying to reduce and relieve future burden from long term complications occurrence. So, it was not specific for only the addition cost for diagnosis of gestational diabetes but also covered the cost of early treatment too. These costs were comprised of the cost from provider and patient site. The patient's opportunity cost(Table 4.14), in this study included especially cost of treatment for macrosomia with hypoglycemia with directly resulted from impropered management, and the scenario of kidney disease cost that is one of the major long term complication from the early stage until the end stage. The others such as cost of original life span, non health, health care for other diseases were excluded. In the six false negative cases from American Diabetic Association Recommendation, the patient's cost were comprised of direct cost (cost of treatment of macrosomia with hypoglycemia, cost of hemodialysis of ESRD and transportation) and indirect cost (productivity loss) : totally, equal to 280,168.26 baht. Some components of cost such as the productivity

loss could be exclusively for only the patient, but the others such as medical cost for hemodialysis, cost for diagnosis etc. could be shown in either health's provider's or patient's perspective. For the purpose of simple imagination, this table attempts to show the comparison those kind of costs in patient's perspective. Moreover, it could be seen clearly for the patient how much the miserable were relieved. The total cost of additional cost 182,970.63 baht, so 97,197.63 baht(**280,165.26**-182,970.63) was preserved.

If the six false negative cases could be diagnosed by BMA Medical College and Vajira Hospital Practical Guideline , and the proper management were done, the patient 's cost will contain cost of insulin treatment for diabetes, ACE inhibitor in treatment kidney disease and the other same cost components which reduced cost to only 39,470.35 baht. The patient could save 240,694.91 baht (280,165.26-39,470.35).

This study was retrospective study because of the limitation of time, the most appropriate research design should be randomized controlled trial. The pitfall of this type of research was the limitation of data recruited. In this study 363 patients with 480 visits were excluded due to not fulfill the inclusion criteria of research group or lost of medical records, more or less this amount may have an impact on research results. In calculation of cost, in this study, using many assumptions such as the group of non revenue producing cost center – using the information of unit cost in the year 2001 with modified value by inflation rate that seem not exactly the same as collected the data directly; or by the patient's cost, the scenario of kidney disease that is the major cost from Saktong 's Master thesis was simulated by Markov model and modified by inflation rate to used in this study.

5.2 Policy implications

By the information above, it was clearly demonstrated that BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes is

more cost effective than the American Diabetic Association Recommendation especially in prevention the future lost of the patient by missed diagnosis. Diabetes is a costly disease in term of personal and financial impact. But this can be improved by improvement of the efficiency of diagnosis, blood glucose control, and treatment for diabetic complication.

By BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes could recruited the undiagnosed cases and with proper treatment, the study show the value of using optimum resources and improve health outcomes.

This study confirm the optimum use of practical guideline that was recently used last year (2003), as the policy makers who should implement a method in which health care resources available now and in the future in the most efficient way to maximize health to the people. And it all accepted that , prevention is more cost-effective than treatment. Therefore, health care planners should focus on the most efficient method in diagnosis of gestational diabetes as one alternative in prevention and early intervention of diabetic complications.

5.3 Recommendation for further studies

In this study the additional cost in test of BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes 143,500.28 baht. The cost was more than cost in test of American Diabetic Association Recommendation which was only 100,996.16 baht . If the criteria in decision of positive test of GCT lower to 130 mg.%, the unnecessary additional test in BMA Medical College and Vajira Hospital Practical Guideline may be reduced then the additional cost also reduced.

That will be more efficiency. The data will be more precise by using the randomized controlled study research design.

The long term complications of diabetes were comprised of many diseases such as cardiovascular disease, nephropathy, retinopathy, neuropathy, etc . In this study, the study of scenario kidney disease was the only one disease that talking about. The others especially cost of burden of cardiovascular, which was the major complication , that will include the cost and benefits of preventing and treating should be carried out.

For this type of economic research frequently based on secondary data that available. Until now the limitation of these could be the obstacle to received the accuracy of economic estimation. As for policy recommendation, policy makers should pay attention and support the research that relevant to the longitudinal such as long term clinical studies and epidemiological studies.

5.4 Conclusions

This study compared cost-effectiveness in diagnosis of gestational diabetes between two programs, BMA Medical College and Vajira Hospital Practical Guideline and American Diabetic Association Recommendation. The results showed about how much it cost for each program, even per each case in diagnosis. Incremental ratio analysis was also done also. Moreover, comparing the invested cost for additional cost for recruited the undiagnosed cases with the cost of improper- treated possible events, in this study scenario of kidney disease with and without proper management.

It was found that the cost in diagnosis of gestational diabetes of American Diabetic Association Recommendation was 322,860.90 baht and 30 cases were

diagnosed. The cost of BMA Medical College and Vajira Hospital Practical Guideline was 244,496.44 baht and 36 cases were diagnosed. The important part of the cost of American Diabetic Association Recommendation in diagnosis of gestational diabetes was the future cost of the undiagnosed cases which in this study concerned only cost of hemodialysis for kidney disease as an example to show how big the burden was if improper diagnosis and treatment occurred. In medical practice and research, this problem of future cost was always neglected . But in this study clearly showed that it was one of major problem in evaluation of cost-effectiveness that should always be concerned. Cost per case for diagnosis of gestational diabetes of American Diabetic Association Recommendation and BMA Medical College and Vajira Hospital Practical Guideline in health provider's perspective were 10,762.03 and 6,791.57 baht per case respectively. And in patient's perspective were 333,947.26 and 156,714.23 baht and 11,198.24 and 4,353.15 baht per case similarly.

By both perspective it was demonstrated that to receive the same result (1 diagnosis of gestational diabetes) the cost of BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes were cheaper than American Diabetic Association Recommendation. The incremental cost-effectiveness ratio was -13,060.74 and -29,538.84 baht per case. These meant that BMA Medical College and Vajira Hospital Practical Guideline in diagnosis of gestational diabetes was more cost-effective than American Diabetic Association Recommendation. With a missed diagnosis, the cost of the patient will be 280,168.26 baht, but if diagnosis could be done the patient lost will decrease to 39,470.35 baht.