CHAPTER IV

RESULTS

Findings of the study among diabetic outpatients with different health insurance coverage were divided into five main parts which are 1) general information, 2) hospital management and policies on drug use and care process, 3) perceptions and concerns of health care on financial problems of hospitals and impacts of the 30-Baht Policy implementation, 4) patterns of drug use and number of patients, and 5) patterns of care process.

Part I General information

Four public hospitals, under the Ministry of Public Health, including two regional hospitals, one general hospital, and one hospital under the Department of Medical Services, with comparable facilities with regional hospitals, were recruited in this study. Characteristics of them are shown in Table 4.1

Table 4.1 Characteristics of four studied hospitals

Characteristics	Hospital 1	Hospital 2	Hospital 3	Hospital 4
1. Type	Under the Department of Medical Services (comparable with regional hospital)	Regional hospital	Regional hospital	General hospital
2. Size (number of beds)	650	750	680	509
3. Location	Bangkok	Southern part of Thailand	Central part of Thailand	Central part of Thailand
4. Average number of outpatients per day	1,500	1,800	2,000	2,000
5. Starting of the 30-Baht Policy implementation	January, 2002	October, 2001	June, 2001	April, 2001

Part II Hospital management and policies on drug use and care process

The information in this part of the study was from the documented reviews of every PTC minute and every hospital drug formulary list and was also confirmed by interviews of the head of pharmacy department and/or the secretary of the PTC and physicians.

Aspects from health care professional interviews and document reviews of each hospital are reported in five main elements. Three elements entailed documented and non-documented rules and regulations of hospitals, i.e. hospital policies on drug use, hospital policies on laboratory tests and physical examinations, hospital management. The rest two elements manifested perceptions and concerns of health professionals, especially physicians, that might conceivably influence prescribing patterns of drug use, laboratory test, and physical examination as well.

Regarding hospital policies on drug use, Hospital 1 had an official documented list of certain drugs in the hospital formulary, especially high cost drugs, with restricted prescribing for the CAP:30B-GB patients and had a generic substitution policy for these schemed for the reason of hospital's financial problems. In addition, the intensity of the restriction after the 30-Baht Policy implementation was higher than before the policy implementation which were the GB patients. For the CAP:SSS patients, prescribers were encouraged to use more ED than non-ED drugs but an opportunity to access high cost drug was more than the CAP:30B-GB patients. The reason is that the hospital had a promotion to include more CAP:SSS patients mainly because the hospital gained more cost-effective proceeds from this scheme. For the FFS patients, slightest restrictions on drug use were adopted. At the same time, the rest three hospitals had equity policy on drug use for the reason that they wished to provide equality care for all patients and wanted to avoid a risk of suing by the capitation patients.

On the issue of hospital policies on laboratory tests and physical examinations, all hospitals had no policy to restrict these processes of care, except for the Hospital 1 that required capitation patients to pay for outsourcing procedures.

Relating to hospital management, the CAP:SSS patients in every hospital were provided care in separate settings of service by GP at the beginning, whereas the FFS patients had their freedom of choice. For the CAP:30B-GB patients, most of the hospitals assigned GP at first visit and two hospitals arranged separate service settings for them. About standard diabetic treatment guidelines, none of the hospitals implemented the official documented guidelines for physicians. For encouragement to take care more patients, three of four hospitals contributed additional remuneration, other than regular salaries, to physicians for taking of the CAP:SSS patients.

The overall results of this part of the study are reported in Table 4.2. For the group of CAP:30B-GB patients, CAP:30B means the 30-Baht patients after the 30-Baht Policy implementation and GB means the government budget patients before the policy implementation.

Table 4.2 Hospital management and policies on drug use and care process

Characteristics	Hospital 1	Hospital 2	Hospital 3	Hospital 4
1. Hospital policies on drug uses				
1.1. drug formulary list	– CAP:30B-GB: use more ED drugs, especially in List A and B and others with approval. – FFS: all ED drugs, list A, B, C, and D and non-ED with approval – CAP:SSS: use more ED drugs and non-ED with approval	– one drug list for all patients regardless of health insurance schemes	– one drug list for all patients regardless of health insurance schemes	– one drug list for all patients regardless of health insurance schemes
1.2. restriction on expensive drug use	– CAP:30B-GB: most limited use in expensive drug, more restrictions for the CAP:30B patients than the GB patients	– not depending on schemes	– not depending on schemes	– not depending on schemes
1.3. generic or therapeutic substitution	– one original and one local brand for one generic name of some drugs – CAP:30B-GB: routine generic substituted – FFS and CAP:SSS: depending on physicians' decisions on choices of brand	– one brand for one generic name of all drugs – no generic or therapeutic substitution	– one brand for one generic name of all drugs – no generic or therapeutic substitution	– one brand for one generic name of all drugs – no generic or therapeutic substitution

Table 4.2 Hospital management and policies on drug use and care process (continued)

Characteristics	Hospital 1	Hospital 2	Hospital 3	Hospital 4
3. Hospital management				
3.1. type of physicians, GP or specialist, assigned to take care patients	– CAP:30B-GB: start with GP – FFS: patient's choice – CAP:SSS: start with GP	– CAP:30B-GB: patient's choice – FFS: patient's choice – CAP:SSS: start with GP	– CAP:30B-GB: start with GP – FFS: patient's choice – CAP:SSS: start with GP	– start with GP for all schemes
3.2. specific service settings	– CAP:30B-GB: separated examination rooms – FFS: general OPD – CAP:SSS: separate examination rooms	– CAP:30B-GB: general OPD – FFS: general OPD – CAP:SSS: separate examination rooms	– CAP:30B-GB: separated PCU – FFS: general OPD – CAP:SSS: separate examination rooms	– CAP:30B-GB: general OPD – FFS: general OPD – CAP:SSS: separate examination rooms with special one stop services for marketing reason
3.3. standard diabetic treatment guidelines implementation	– no hospital official standard diabetic treatment guidelines	– no hospital official standard diabetic treatment guidelines	– no hospital official standard diabetic treatment guidelines	– no hospital official standard diabetic treatment guidelines
3.4. extra payment incentives to physicians	– CAP:SSS: share extra money among physicians who took turns in the patient care	– CAP:SSS: share extra money among physicians who took turns in the patient care	– salary only, no extra remuneration	– CAP:SSS: share extra money among physicians who took turns in the patient care

Table 4.2 Hospital management and policies on drug use and care process (continued)

Characteristics	Hospital 1	Hospital 2	Hospital 3	Hospital 4
1.4. restriction on period of prescription (visit interval)	– GB: no restriction – CAP:30B: not more than 2 months or more than 2 months with overall drug charge of less than 600 baht per visit – FFS: no restriction – CAP:SSS: not more than 2 months for expensive drugs	– no restriction, relying upon physicians' judgment on individual patient's condition	– no restriction, relying upon physicians' judgment on individual patient's condition	– no restriction, relying upon physicians' judgment on individual patient's condition
2. Hospital policies on laboratory tests and physical examinations				
2.1. restriction on frequencies and types of procedures	– no restriction	– no restriction	– no restriction	– no restriction
2.2. extra payment by patients themselves	– CAP:30B-GB and CAP:SSS: patients have to pay for outsourcing tests	– CAP:30B-GB and CAP:SSS: no extra payment for any tests including the outsourcing tests	– CAP:30B-GB and CAP:SSS: no extra payment for any tests including the outsourcing tests	– CAP:30B-GB and CAP:SSS: no extra payment for any tests including the outsourcing tests

Part III Perceptions and concerns of health care on financial problems of hospitals and impacts of the 30-Baht Policy implementation

The information in this part of the study was from health care professional interviews, mainly from physicians' interviews. However, other health care professional also had the very similar perceptions and concerns. Consequently, all of the perceptions and concerns were assembled into distinct characteristics for each hospital.

Regarding perceptions of health care professionals on impacts of the 30-Baht Policy implementation for Hospital 1, extreme burdens of a rise in number of patients were enlarged and resulted in a brain drain problem that was an obstacle to provide satisfactory quality care. For the rest three hospitals, physicians perceived that the number of patients was increased but it was not seemed to be as serious as the situation in Hospital 1.

About an insufficient budget problem for the 30-Baht patients, it seemed to be a commonest situation of all hospitals. Every hospital, except Hospital 2, tried their hardest to survive from financial problems by expanding their services into the CAP:SSS market to gain more returns. Nevertheless, Hospital 2 that had fewer social security workers in their area had no policy on the expansion of the CAP:SSS patients. And without hospital policy on drug cost containment, Hospital 2 was confronted severe financial problems.

For concerns of physicians for diabetic care for every studied hospital, prescribers attempted to use inexpensive ED drugs first for capitation patients, CAP:30B-GB and CAP:SSS, in order to restrain drug expenditure with the intention of a decline in financial problems of the hospital. Simultaneously, physicians thought that they would expand an opportunity of the FFS patients to gain access to new drugs with high costs. With regard to laboratory tests and physical examination procedures, physicians' considerations were not relying upon the schemes but on the individual patient's conditions. Excepting Hospital 1, capitation patients were required to pay for outsourced tests. It seemed to have a discrepancy in practice for patients in the same scheme among different hospitals.

The overall results of this part of the study are reported in Table 4.3.

Table 4.3 Perceptions and concerns of health care professionals on financial problems of hospitals and impacts of the 30-Baht Policy implementation

Characteristics	Hospital 1	Hospital 2	Hospital 3	Hospital 4
1. Perceptions of physicians on impacts of the 30-Baht Policy implementation				
1.1. burden of a rise in number of patients	– number of patients increase about 50% – a major brain drain of physicians because of too heavy workload as a result	– number of patients increase	– number of patients increase	– number of patients increase
1.2. sufficiency of budget allocated to the hospitals	– insufficient budget that lead to financial problems – try to survive by a promotion for more registered members of social security beneficiaries	– insufficient budget that lead to severe financial problems (loss of hospital's reserved money about 30-40 million baht per year since the beginning of the policy)	– insufficient budget for the 30-Baht patients – compensate loss of income by boosting CAP:SSS registered member in order to obtain income – extra budget from the government for the 30-Baht Policy implementation – no overall financial problems	– insufficient budget for the 30-Baht patients – compensate loss of income by boosting CAP:SSS registered member in order to obtain income – no overall financial problems

Table 4.3 Perceptions and concerns of health care professionals on financial problems of hospitals and impacts of the 30-Baht Policy implementation (continued)

Characteristics	Hospital 1	Hospital 2	Hospital 3	Hospital 4
1.3. practice on diabetic care	– deficiency of time to provide satisfactory quality care due to intense number of patients together with a shortage of physicians after the 30-Baht Policy implementation – significant impacts of the 30-Baht policy on diabetic care practice	– intense number of patients but no significant changes in diabetes care practice before and after the policy implementation	– intense number of patients but no significant changes in diabetes care practice before and after the policy implementation	– intense number of patients but no significant changes in diabetes care practice before and after the policy implementation

Table 4.3 Perceptions and concerns of health care professionals on financial problems of hospitals and impacts of the 30-Baht Policy implementation (continued)

Characteristics	Hospital 1	Hospital 2	Hospital 3	Hospital 4
2. Concerns of physicians for diabetic care in patients with different payment methods				
2.1. drug use	– expand opportunity to gain access to new drug with high cost for fee-for-service patients more than capitation patients – start using ED drugs for capitation patient	– expand opportunity to gain access to new drugs with high cost for fee-for-service patients more than capitation patients – start using ED drugs for capitation patient	– expand opportunity to gain access to new drugs with high cost for fee-for-service patients more than capitation patients – start using ED drugs for capitation patient	– expand opportunity to gain access to new drugs with high cost for fee-for-service patients more than capitation patients – start using ED drugs for capitation patient
2.2. laboratory test	– limitation of some required tests that need to be outsourced, i.e. HBA1c and MAU tests, because capitation patients have to pay by themselves	– depend on physicians' judgment on individual patient's condition, not on the schemes	– depend on physicians' judgment on individual patient's condition, not on the schemes	– depend on physicians' judgment on individual patient's condition, not on the schemes
2.3. physical examinations	– depend on physicians' judgment on individual patient's condition, not on the schemes	– depend on physicians' judgment on individual patient's condition, not on the schemes	– depend on physicians' judgment on individual patient's condition, not on the schemes	– depend on physicians' judgment on individual patient's condition, not on the schemes

Part IV Patterns of drug use and number of patients

The interrupted-time series analysis results in this part of the study were explicated to comprehend trend and level of changes before and after the 30-Baht Policy implementation over time by two approaches: visible dynamic changes elucidated from the graphs plotting out each dependent variable over time and statistical analysis for more robust explanations. Therefore, findings from the study were explained by both characteristics. The graphs of three dependent variables, i.e. number of diabetic outpatients per month, average charge of drug per visit of diabetic outpatients, and proportion of charge of non-ED drugs per charge of all drugs prescribed for diabetic outpatients, were explicated for individual hospital. Changes and differences in levels and trends of dependent variables for patients in each health insurance schemes were compared to each other among schemes and between before and after the 30-Baht Policy implementation.

For the proportion of visits of patients with specific originator drug items prescribed for diabetic outpatients in each health insurance scheme with different payment incentives, the prescribing data of all four hospitals were summarized in one analysis owing to insufficiency in number of visits with these drugs for the analysis of each hospital individually. For the new high cost platelet aggregation inhibitors, the prescribing data was combined from only three hospitals. It's because the Hospital 4 had no kind of this expensive drug in the hospital formulary list.

Apart from dependent variables mentioned, the exhibits of the other two minor dependent variables involved with patterns of drug use, including average number of drug items prescribed per visit and average number of visits per patient per month, are displayed in Appendix B.

Findings from graphs

For number of diabetic outpatients per month, average charge of drug per visit of diabetic outpatients, and proportion of charge of non-ED drugs per charge of all drugs prescribed for diabetic outpatients:

Hospital 1

1. Number of diabetic outpatients per month

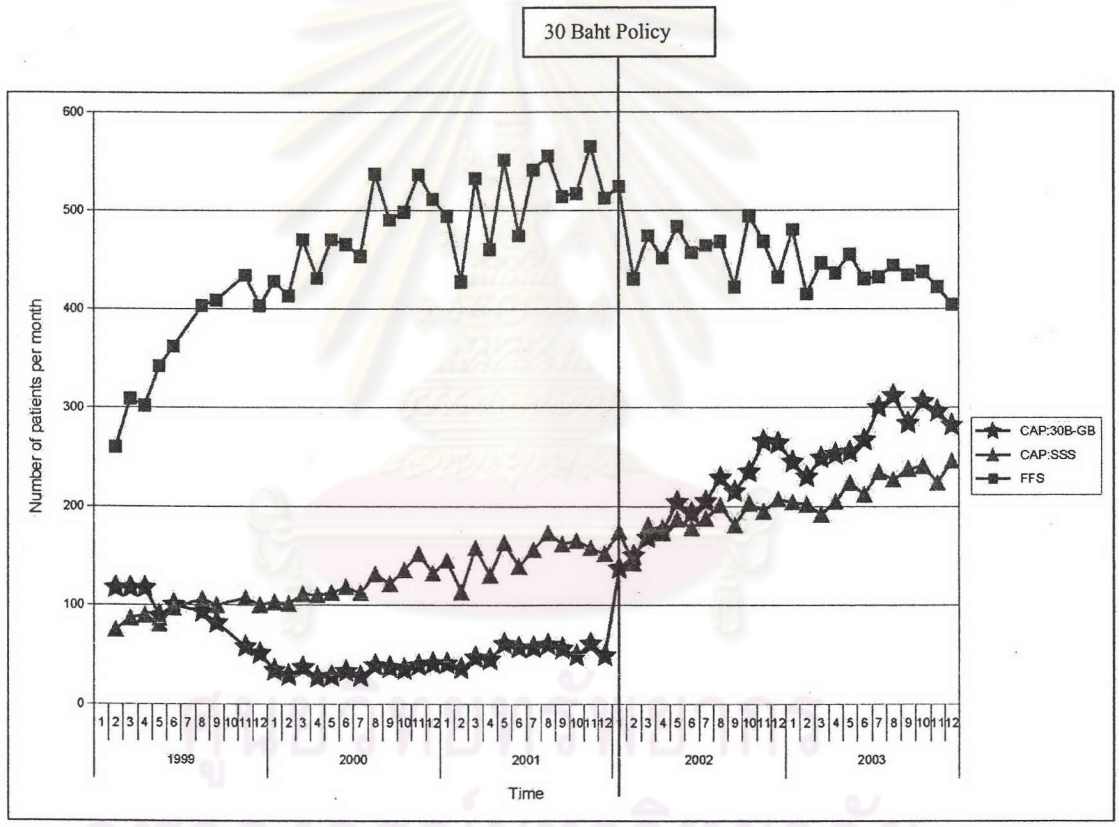

Figure 4.1 Hospital 1 – Number of diabetic outpatients per month

As shown in Figure 4.1, before the 30-Policy implementation, number of CAP:30B-GB patients was lowest and stable whereas FFS patients were the major portion of patients with quite rapidly increasing in trend. After the 30-Baht Policy implementation, number of patients in the CAP:30B-GB scheme increased dramatically in level and trend of change while CAP:SSS patients increased slightly in trend of change compared with the CAP:30B-GB patients. In contrast, number of FFS patients diminished rapidly in level and gradually in trend of change. A decrease in number of the 30-Baht patients seemed to be comparable to an increase in number of the FFS patients

2. Average charge of drug per visit of diabetic outpatients

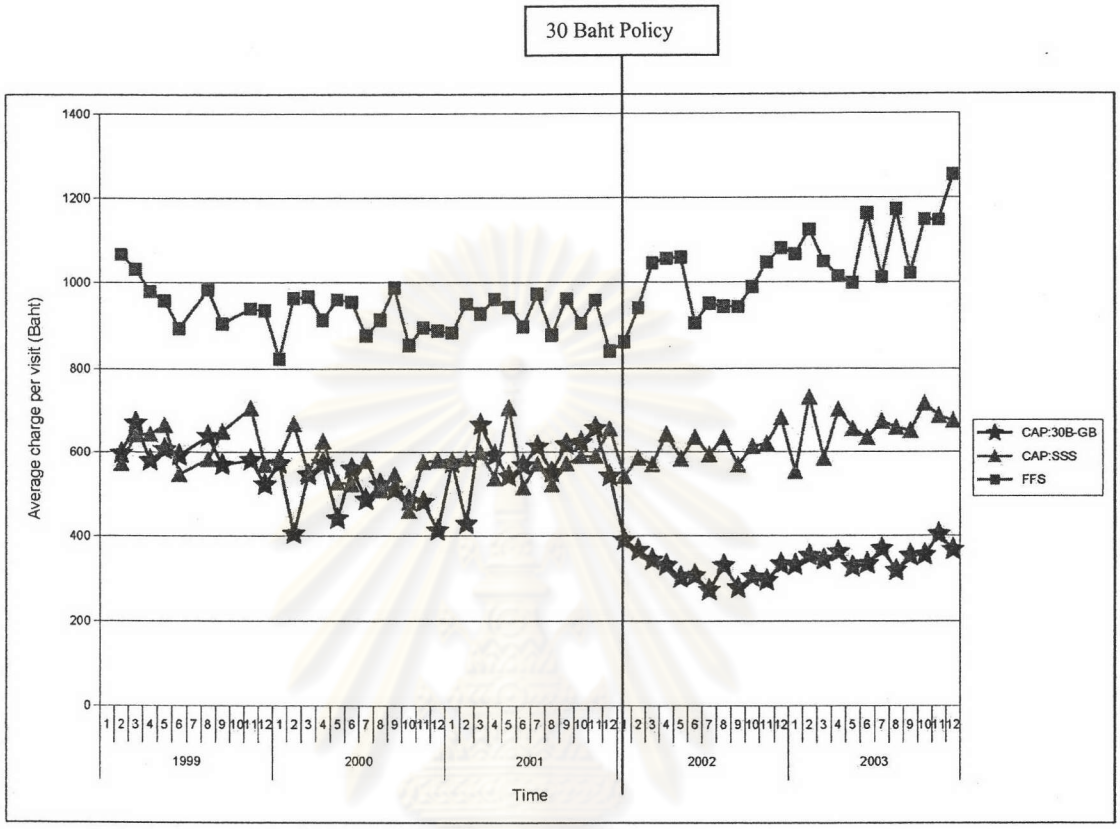

Figure 4.2 Hospital 1 – Average charge of drug per visit per month

As shown in Figure 4.2 Before the 30-Policy implementation, the average charge of drug per visit per month of the CAP:30B-GB and CAP:SSS patients were fairly at the same level and sustained over time, while the average charge of FFS patients was also sustained but at the superior higher. After the 30-Policy implementation, the average charge of CAP:30B-GB patients lessened significantly and constantly, while of CAP:SSS patients increased vaguely. It can be described that after the 30-Baht Policy implementation, the average charge for the 30-Baht patients was inferior to that for the GB patients. On the contrary to CAP:30B-GB patients, the average charge of FFS patients climbed up progressively after the 30-Baht Policy implementation.

3. Proportion of charge of non-ED drugs per charge of all drugs prescribed for diabetic outpatients

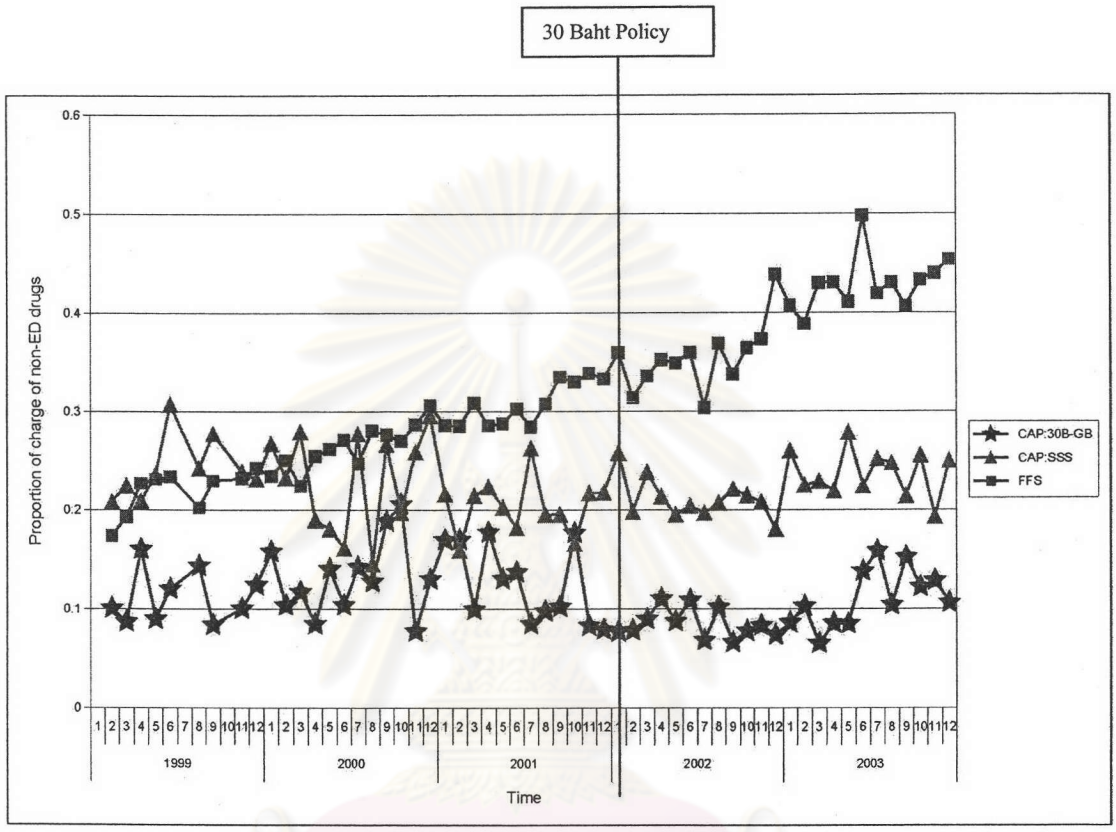

Figure 4.3 Hospital 1 – Proportion of charge non-ED drugs per visit per month

As shown in Figure 4.3, before the 30-Baht Policy implementation, the proportion of charge of non-ED drugs per charge of all drugs prescribed per visit in each month for diabetic outpatients in the CAP:30B-GB scheme was stable at the lowest level, while for the CAP:SSS patients was steady at a slightly higher level. For FFS patients, the proportion level was at a greater level with an increasing trend. After the 30-Baht Policy implementation, the proportions were obviously different – quite constant at the lowest level for CAP:30B-GB patients, constant at a rather level for CAP:SSS patients, and a higher level with noticeable increase for FFS patients.

Hospital 2

1. Number of diabetic outpatients per month

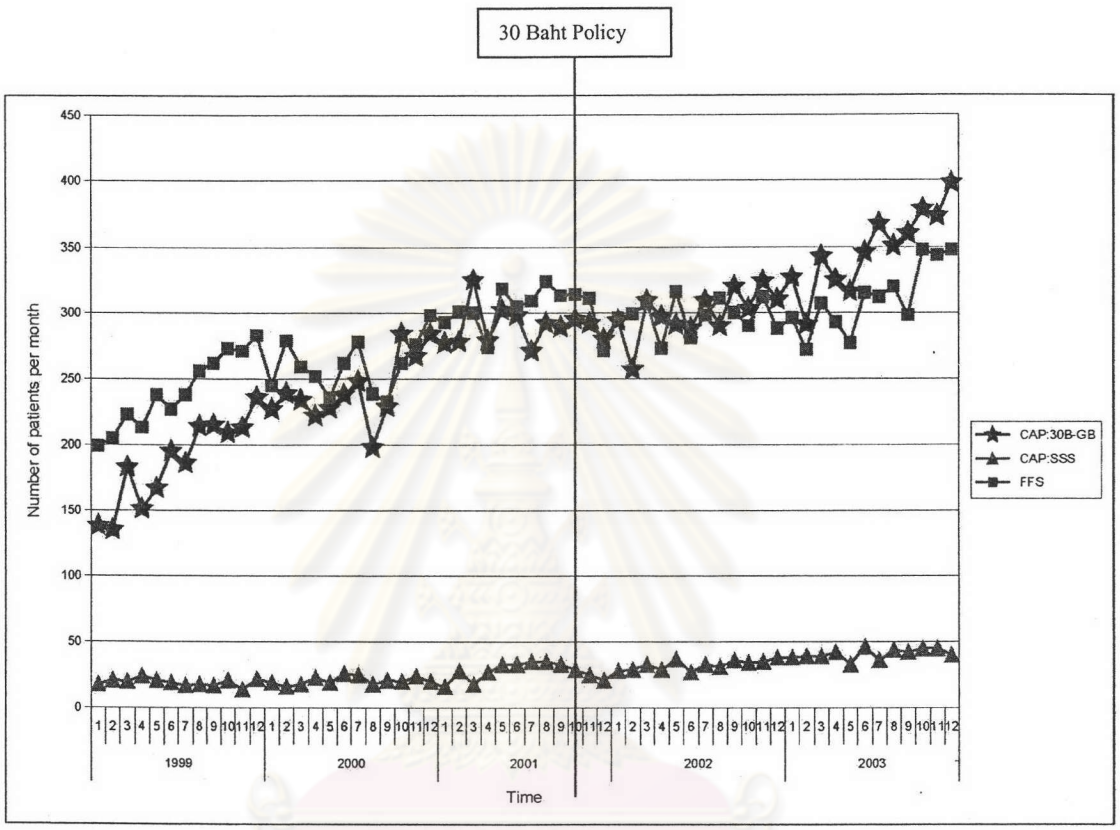

Figure 4.4 Hospital 2 – Number of diabetic outpatients per month

As shown in Figure 4.4, before the 30-Baht Policy implementation, the CAP:30B-GB and FFS patients were the largest and quite equaled in number of patients with marked increasing trends, while the number of CAP:SSS patients was constant at a very tiny level. After the 30-Baht Policy implementation, CAP:30B-GB patients enlarged with more rapid rate than the rising of FFS patients, but CAP:SSS patients were still the least with a very slow increasing rate.

2. Average charge of drug per visit of diabetic outpatients

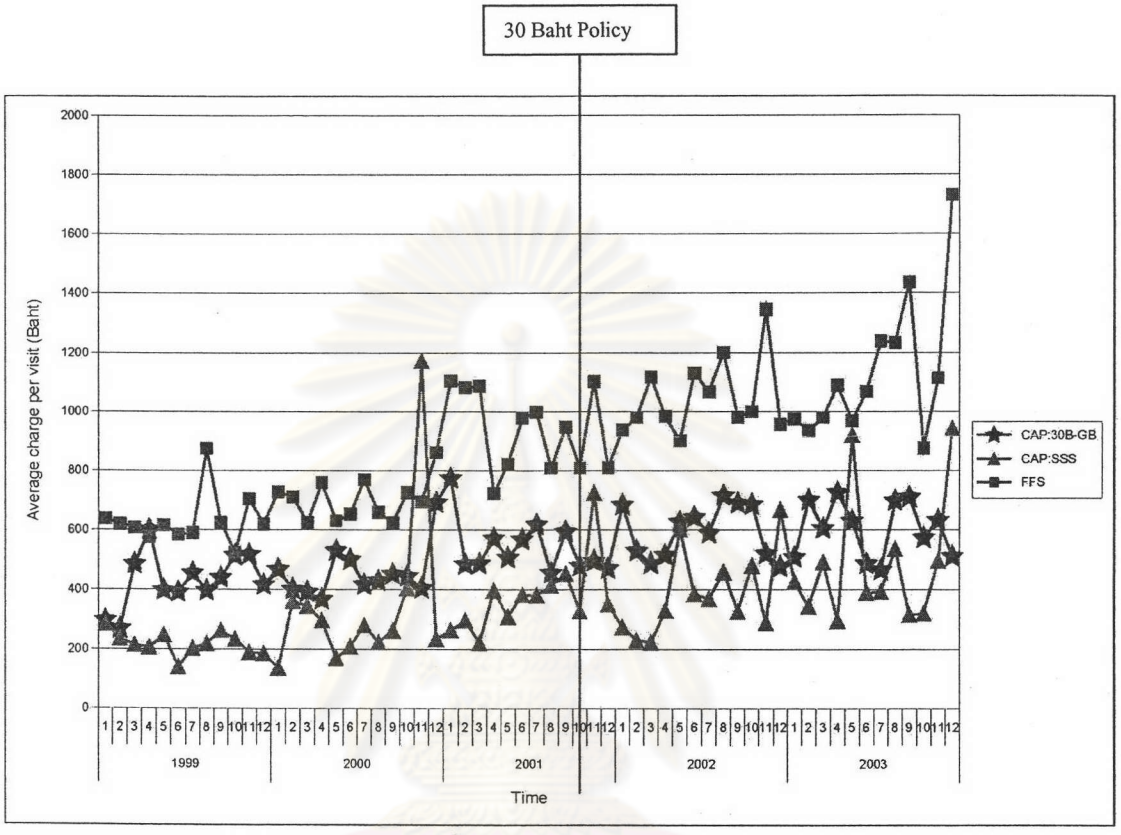

Figure 4.5 Hospital 2 – Average charge of drug per visit per month

As shown in Figure 4.5, before the 30-Baht Policy implementation, the average charge of drug per visit per month was highest for the FFS patients, moderate for the CAP:30B-GB patients and the lowest for the CAP:SSS patients. The average charge for every scheme seemed to increase gradually. After the 30-Baht Policy implementation, the average charge of the FFS patients rose up with a higher rate than the rest two schemes that were quite steady levels. The average charge for the CAP:30B patient had slightly higher level than for the CAP:SSS patients.

3. Proportion of charge of NON-ED drugs per charge of all drugs prescribed for diabetic outpatients

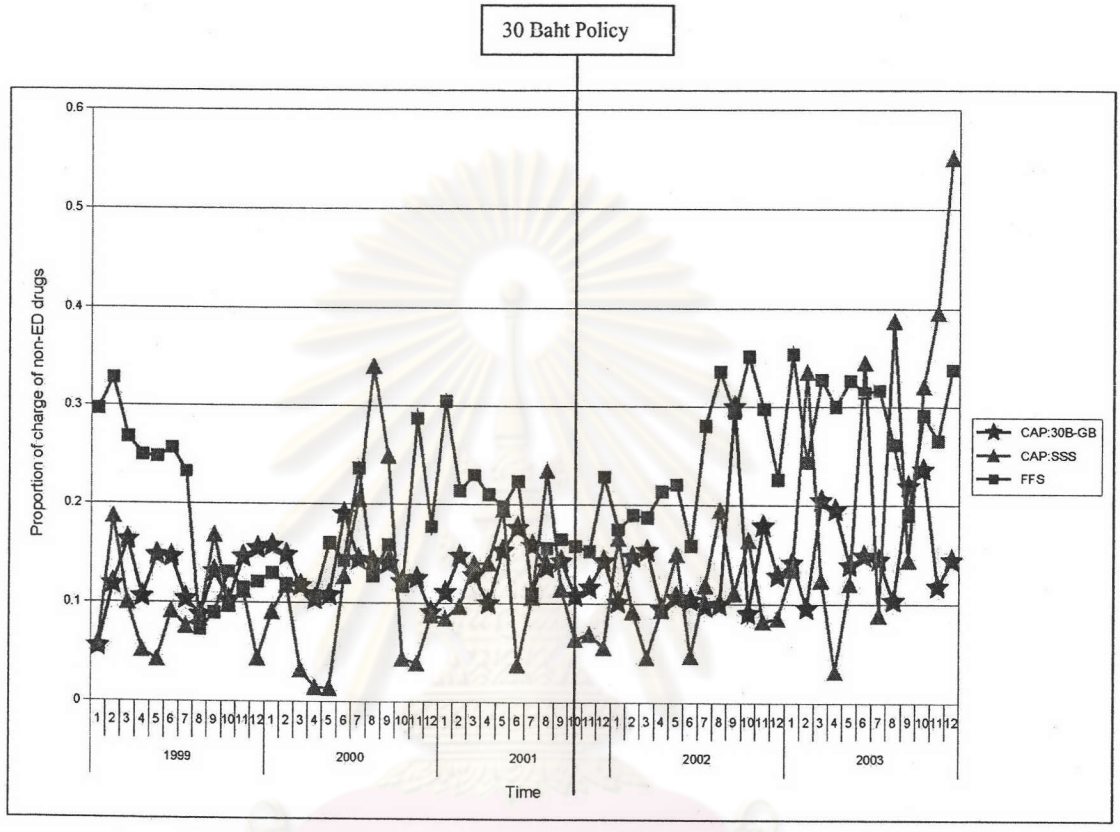

Figure 4.6 Hospital 2 – Proportion of charge NON-ED drugs per visit per month

As shown in Figure 4.6, before the 30-Baht Policy implementation, the proportion of charge of NON-ED drugs per charge of all drugs prescribed per visit in each month for the FFS patients was higher at the early 1999 and lesser at the late 1999 with an increasing rate after that. For the CAP:30B-GB and the CAP:SSS patients, the proportions of charge were quite constant at lower level than for the FFS patients. After the 30-Baht Policy implementation, the proportion of charge for the CAP:30B-GB patients continued the similar pattern to before, while the proportions of charge for the FFS and the CAP:SSS patients rose up, especially with higher level with an increasing rate for the FFS patients. A wide variation of the proportion for CAP:SSS related with a very small number of patients in this group and some patients were prescribed high cost drugs such as cancer drugs.

Hospital 3

1. Number of diabetic outpatients per month

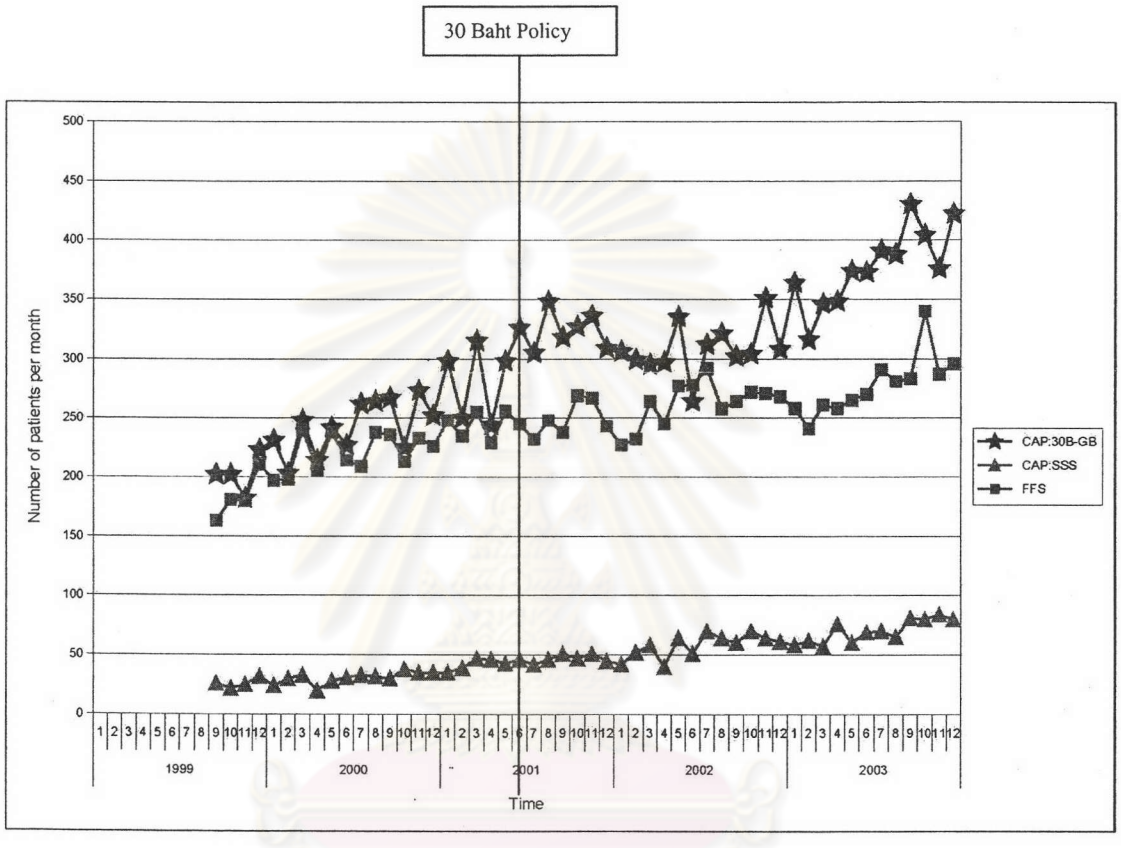

Figure 4.7 Hospital 3 – Number of diabetic outpatients per month

As shown in Figure 4.7, before the 30-Baht Policy implementation, the CAP:30B-GB and the FFS patients were the largest and quite equaled in number of patients at the first few months of the series but the number of the CAP:30B-GB patients increased with a higher rate than the FFS patients. For the CAP:SSS patients, the number of patients was very small and increased with a very slow rate compared to the rest two schemes. After the 30-Baht Policy implementation, the number of the CAP:30B-GB patients enlarged substantially, while the number of the FFS patients increased with a lower rate than the CAP:30B-GB patients. For the CAP:SSS patients, the level and the slight increasing rate of change in number of patients was quite continued with before.

2. Average charge of drug per visit of diabetic outpatients

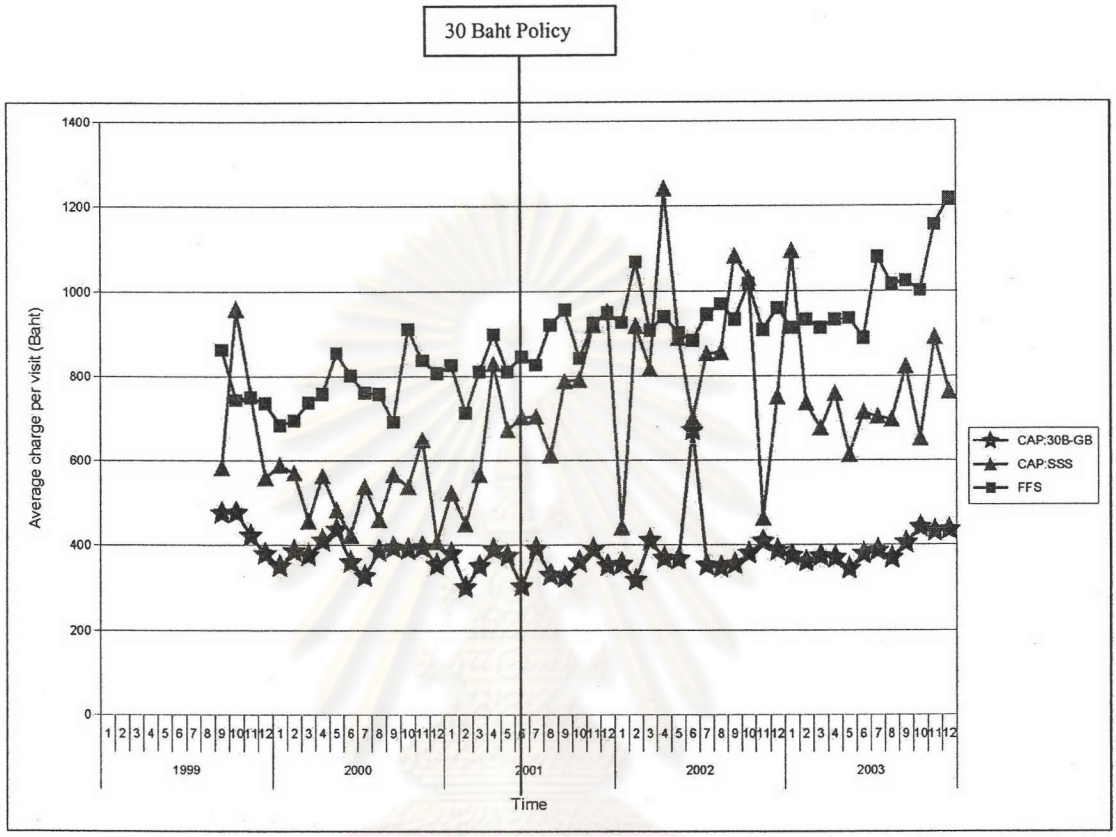

Figure 4.8 Hospital 3 – Average charge of drug per visit per month

As shown in Figure 4.8, before the 30-Baht Policy implementation, the average charge of drug per visit per month was highest for the FFS patients, the moderate for the CAP:SSS patients and the lowest for the CAP:30B-GB patients. The average charge for the CAP:30B-GB patients seemed constant, while for the FFS and the CAP:SSS patients increased gradually. After the 30-Baht Policy implementation, the average charge for the CAP:30B-GB patients appeared to be a comparable pattern to before, while for the rest two schemes continued increasing rates, especially with a higher rate but a lower level for the CAP:SSS patients. A wide variation of the average charge for the CAP:SSS patients related with a small number of patients in this group and some patients were prescribed high cost drugs such as erythropoietin. A possible reason for using these drugs might be owing to complications of diabetes, for example, renal disease.

3. Proportion of charge of NON-ED drugs per charge of all drugs prescribed for diabetic outpatients

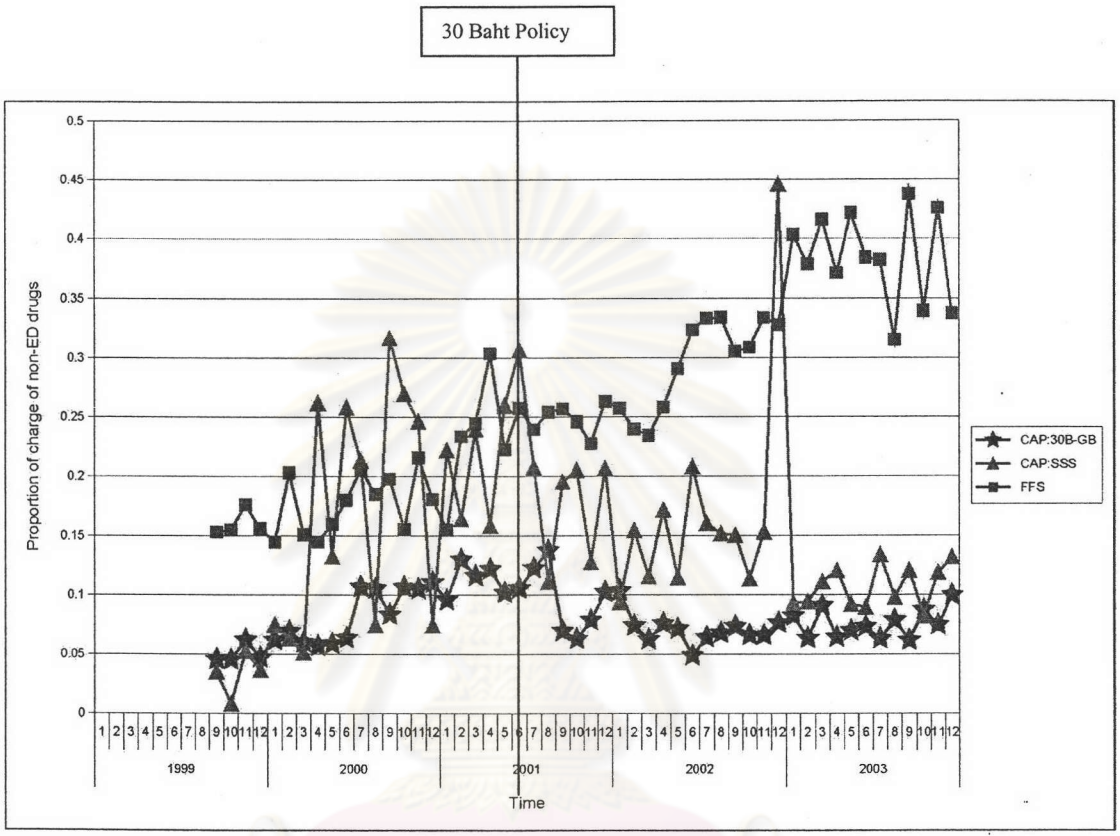

Figure 4.9 Hospital 3 – Proportion of charge NON-ED drugs per visit per month

As shown in Figure 4.9, before the 30-Baht Policy implementation, the proportion of charge of non-ED drugs per charge of all drugs prescribed per visit for the FFS patients was highest and for the CAP:30B-GB patients was lowest with increasing rates for both scheme. For the CAP:SSS patients, the proportion of charge increased markedly but the variation in the proportion was very high. After the 30-Baht Policy implementation, the proportion of charge for the FFS patients increased with a tremendous rate, while the proportions of charge for the rest two schemes decreased and sustained at the slightly lower level than before.

Hospital 4

1. Number of diabetic outpatients per month

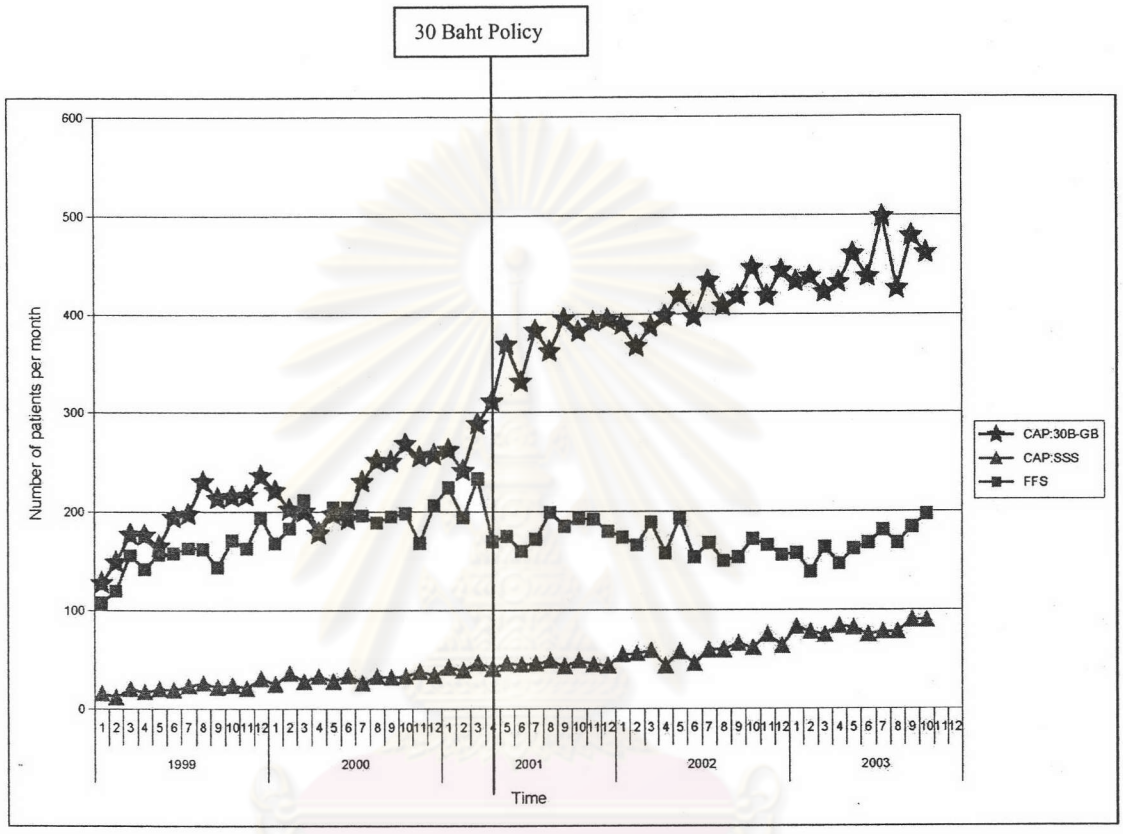

Figure 4.10 Hospital 4 – Number of diabetic outpatients per month

As shown in Figure 4.10, before the 30-Baht Policy implementation, the CAP:30B-GB and the FFS patients were the largest and quite equaled in number of patients at the few first months of the series but the number of the CAP:30B-GB patients increased with a slightly higher rate. For the CAP:SSS patients, the number of patients was very small with a very low rate of increase. After the 30-Baht Policy implementation, the number of the CAP:30B-GB patients expanded enormously and became a largest portion of all patients with an immense increasing rate, while the number of the FFS patients was slightly decreased and sustained the rate of decrease in the number of patients. For the CAP:SSS patients, the level and the rate of change in number of patients was quite continued with before.

2. Average charge of drug per visit of diabetic outpatients

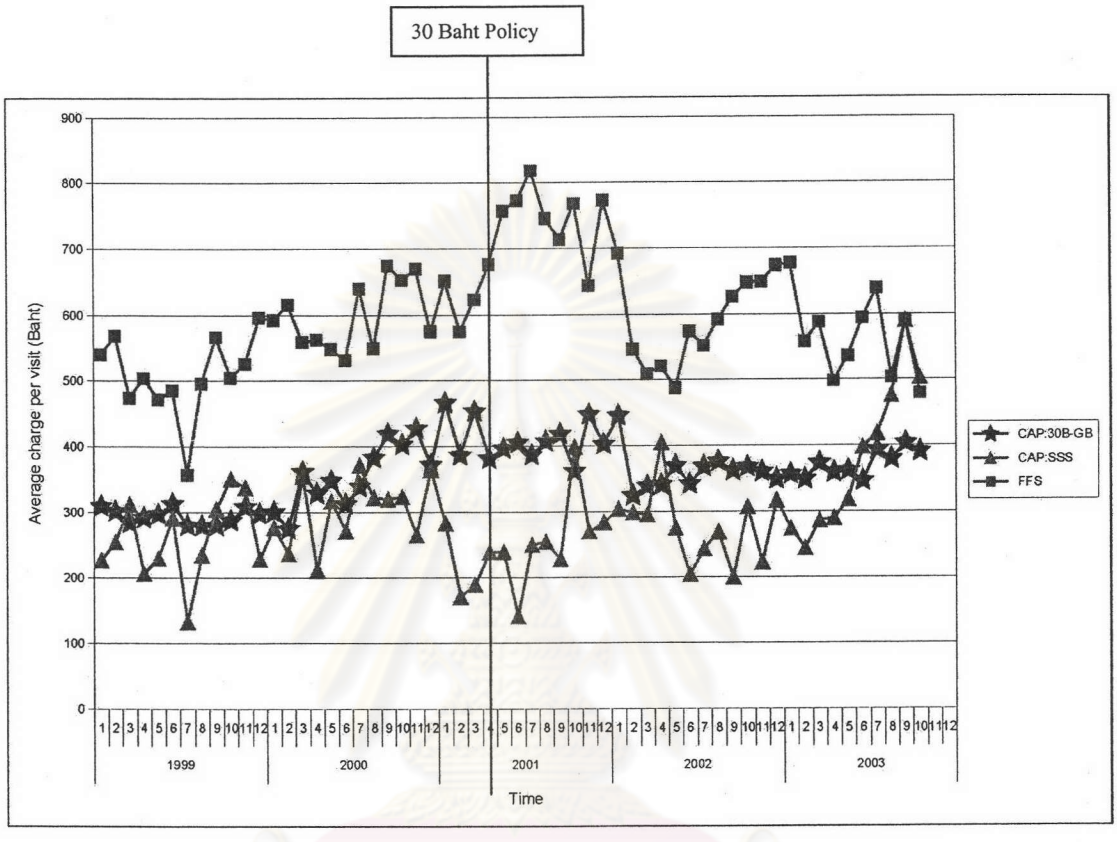

Figure 4.11 Hospital 4 – Average charge of drug per visit per month

As shown in Figure 4.11, before the 30-Baht Policy implementation, the average charge of drug per visit per month was highest in the level and the increasing rate for FFS patients, while the average charge for the CAP:30B-GB patients was largely lower in both level and increasing rate than for the FFS patients. For the CAP:SSS patients, the average charge was close to the CAP:30B-GB patients but quite constant. After the 30-Baht Policy implementation, the average chare for the FFS patients decreased massively, while the average charge for the CAP:30B-GB patients decreased slightly and quite sustained at a steady level. For the CAP:SSS patients, the average charge increased gradually.

3. Proportion of charge of non-ED drugs per charge of all drugs prescribed for diabetic outpatients

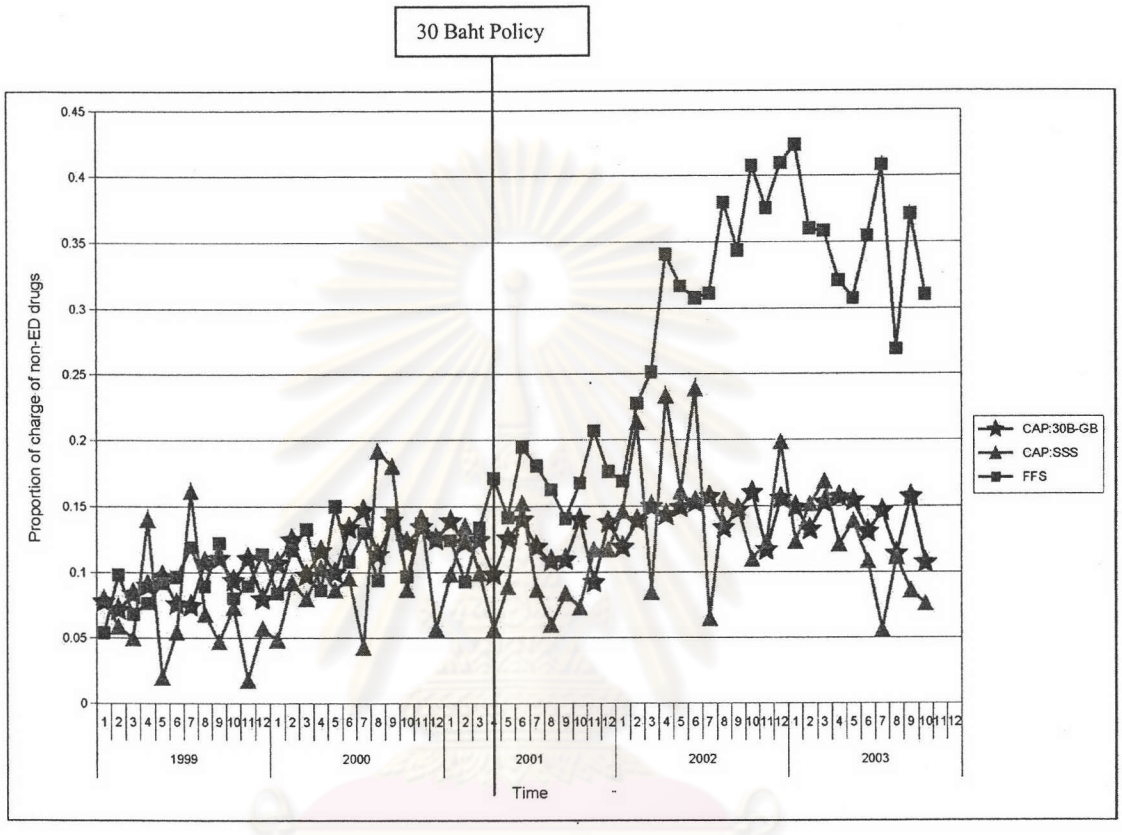

Figure 4.12 Hospital 4 – Proportion of charge non-ED drugs per visit per month

As shown in Figure 4.12, before the 30-Baht Policy implementation, the proportion of charge of non-ED drugs per charge of all drugs prescribed per visit for patients in every scheme seemed to be equal both in a level and a slightly increasing trend of the proportion but the variation of the proportion of charge for the CAP:SSS patients was quite high. After the 30-Baht Policy implementation, the proportion of charge for FFS patients enlarged dramatically, while the proportion of charge for the rest two schemes continued with a steady level.

For the proportion of visits of patients with specific originator drug items prescribed for diabetic outpatients in each health insurance scheme

High cost original oral antidiabetic drugs: Thiazolidinediones

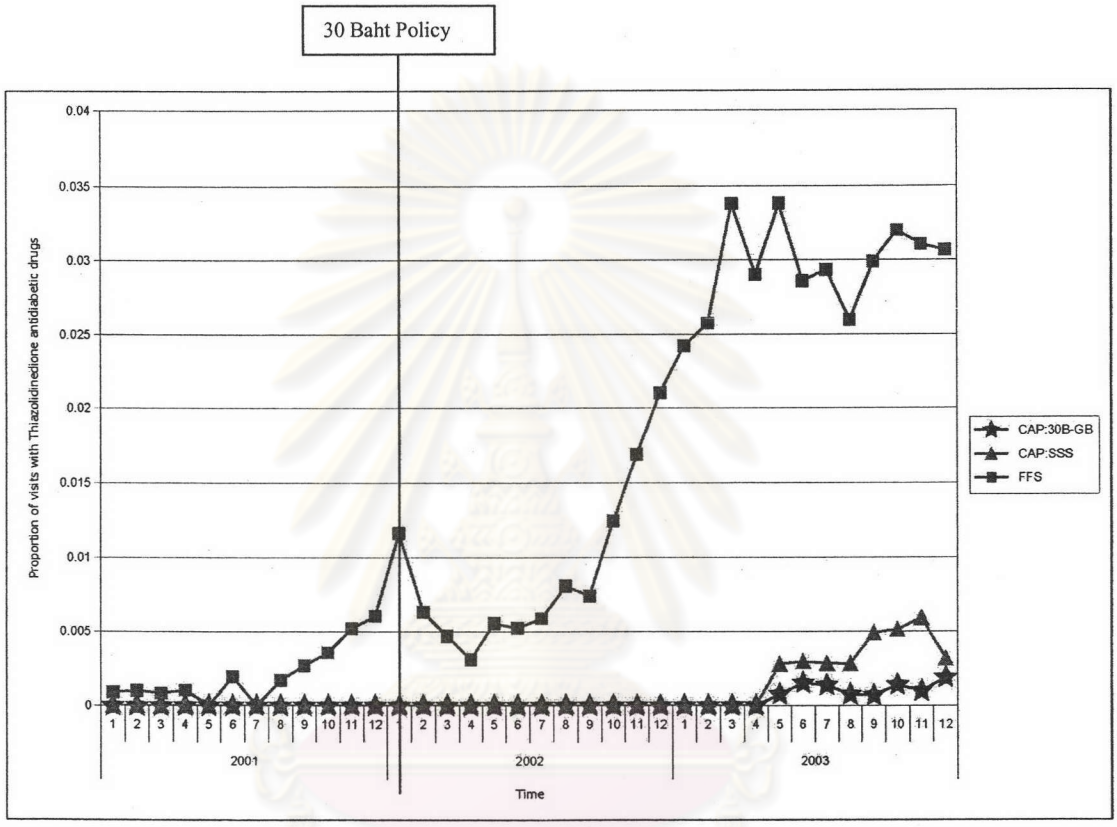

Figure 4.13 Proportion of visits of patients with Thiazolidinediones (combined data of 4 hospitals)

As shown in Figure 4.12, before the 30-Baht Policy implementation, the proportion of visits of patients with Thiazolidinediones per visits of patients with all oral antidiabetic drugs for the FFS patients increased sharply and continuously, while patients in the rest two schemes had no visits with this drug group. After the 30-Baht Policy implementation, the proportion of visits for the FFS patients was expand enormously, while patients in the rest two schemes was started using this drug in May, 2003 with an extremely small proportions compared to the FFS patients.

High cost original antihypertensive drugs: Angiotensin II antagonists and combinations

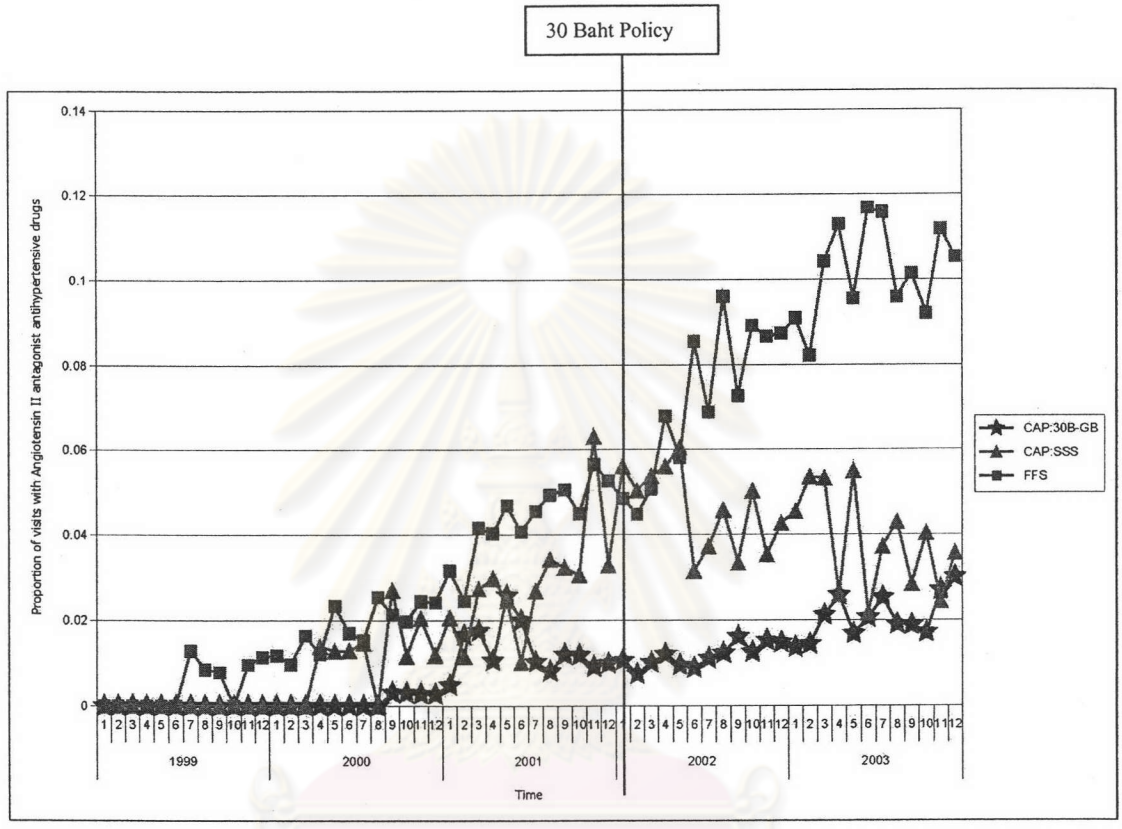

Figure 4.14 Proportion of visits of patients with Angiotensin II antagonists and combinations (combined data of 4 hospitals)

As shown in Figure 4.14, before the 30-Baht Policy implementation, the proportion of visits of patients with Angiotensin II antagonists and combinations per visits of patients with all antihypertensive drugs for the FFS and the CAP:SSS patients increased sharply, while the proportion of visits for the CAP:30B-GB patients was very low and quite constant. After the 30-Baht Policy implementation, the proportion of visits for the FFS patients expanded dramatically, while the proportion of visits for the CAP:SSS patients was slightly decreased and sustained. For the the CAP:30B-GB patients, the proportion of visits continued the same pattern as before with slightly increase in 2003.

High cost original serum lipid reducing drugs: HMG CoA reductase inhibitors (statins)

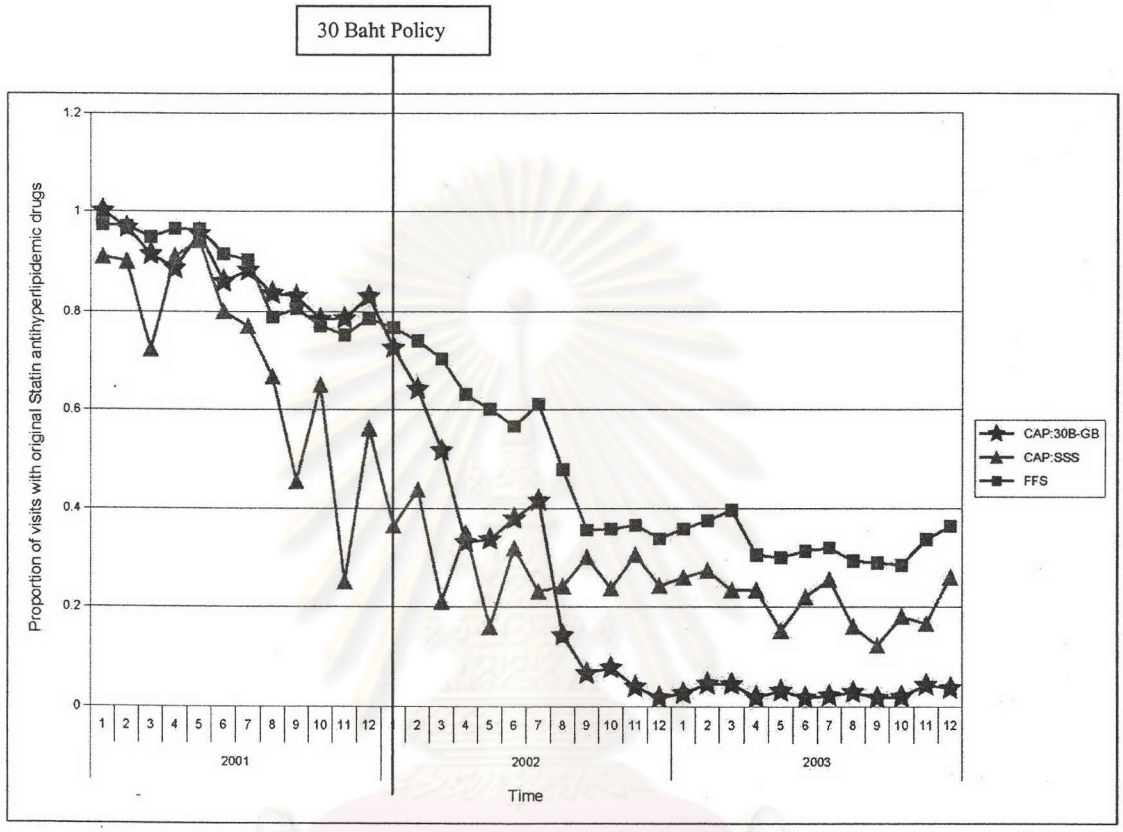

Figure 4.15 Proportion of visits of patients with original statins (combined data of 4 hospitals)

As shown in Figure 4.15, before the 30-Baht Policy implementation, the proportion of visits of patients with original statins per visits of patients with all statins was substantial decreased in every scheme, especially for the CAP:SSS patients. After the 30-Baht Policy implementation, the proportions of visits for patients in every scheme were still continued decrease in rate of changes and then were sustained at the different levels: the highest level for the FFS patients, the lower level for the CAP:SSS patients, and the remarkable lowest level for the CAP:30B-GB patients.

High cost original platelet aggregation inhibitors: Clopidogrel and Ticlopidine

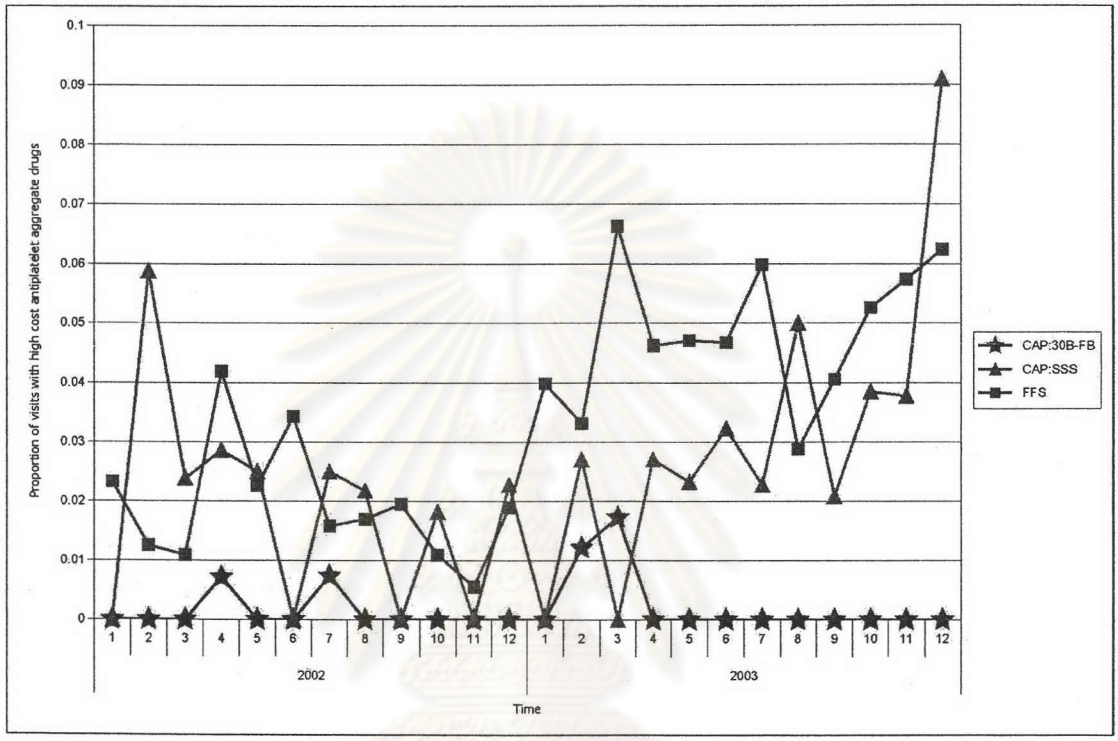

Figure 4.16 Proportion of visits of patients with clopidogrel or ticlopidine (combined data of 3 hospitals)

Note: Not included data of Hospital 4 because these drugs were not contained in the hospital formulary list.

Clopidogrel and ticlopidine was launched into the market in about very late 2001, therefore, the data was included for 2002 and 2003 which was the period after the 30-Baht Policy implementation. As shown in Figure 4.16, the proportion of visits of patients with clopidogrel or ticlopidine per visits of patients with all platelet aggregation inhibitors for the FFS patients seemed to be higher, both in level and increasing rate, than the CAP:SSS patients. At the same time, very least CAP:30B-GB patients had visits with these drugs in only some months.

Findings from segmented regression analysis

Models of segmented regression analysis for three pertinent dependent variables: average charge of drug per visit of diabetic outpatients, proportion of charge of non-ED drugs per all drugs prescribed for diabetic outpatients, and proportion of visits of patients with specific originator drug items prescribed for diabetic outpatients were determined to accomplish patterns of drug use among patients covered by different health insurance schemes and before and after the 30-Baht Policy implementation. The computed results are depicted in Table 4.4, Table 4.5, and Table 4.6, including dependent and independent variables, unstandardized regression coefficients, standardized regression coefficients, and parameters of the model summary as described in Chapter III.

Regarding the dummy scheme variables, the CAP:30B-GB patients was chosen to be a reference because there have been studies that indicated lower cost of drug use in this scheme than the fee-for-service scheme like CSMBS/SE, according to the literature review. Even though the payment of CAP:SSS scheme was comparable to the CAP:30B-GB scheme, the group of age of patients covered by these two schemes and the details of payments, in practice, were different. Accordingly, the nature of effects of these two schemes might be different as well.

In order to estimate influence of each independent variable on the dependent variable, every independent variable was included in the regression model. The statistical significance of regression coefficients ($p<0.05$) indicated the independent variables with statistically significant influence on the dependent variable. The regression coefficient of each independent variable quantified units of changes in the dependent variable with one unit change in that independent variable. However, different independent variables have different units to describe.

Simultaneously, standardized coefficients allowed comparisons of the influence among every independent variable on the dependent variable. The higher number indicates the stronger relative explanatory power of the independent variable. In addition, the sign of the coefficients notifies the direction of the association, the "+" sign denotes the positive relationship whereas the "-" sign denotes the negative relationship.

To identify appropriateness of the regression model in explanation of the dependent variable, the model summary parameter of coefficient of determination (R^2), adjusted coefficient of determination (Adj. R^2), and Durbin-Watson statistic (DW) were calculated and shown in the Table of segmented regression analysis result. As for the seasonal effect, the calculation of partial F-test for all of the regression models in the study were carried out and yielded only one model with the statistically significant seasonal effect which was the model for average charge per visit of FFS patients in Hospital 4. Accordingly, non-existence of seasonal effect seemed to be logically assumed. The only one model with statistical significance might be the significance by chance in running of the statistical analyses. Therefore, seasonal variables were not included in all of the regression models in this study.

An example of the prediction equation, from Table 4.4, for the average charge of drug per visit prescribed for all diabetic outpatients with the scheme independent variables, FFS and SSS, in Hospital 1 was as follows.

Average charge per visit = ***498.91*** – 1.25*BT – ***67.21*LCAP + 6.56*TCAP + 508.73*FFS + 138.36*SSS***

Note: The bold italic components in the equation represent statistical significance of unstandardized regression coefficients of the independent variables or the constant of the equation.

The elucidation with statistically significant differences were that the average charge of drug prescribed for all diabetic patients in this hospital had a level of 489.91 baht per visit, at the beginning of the series of data. Immediately after the 30-Baht Policy implementation, there was a sudden drop in level of average charge per visit about 67.21 baht per visit as an effect of the policy. After that, the average charge per visit climbed up with a trend of increasing rate of about 6.56 baht per month. Concerning the effects of health insurance schemes, the average charge per visit for FFS and CAP:SSS patients was higher than for the CAP:30B-GB patients about 508.73 baht and 138.36 baht, respectively. The baseline trend had no statistical significant effect on the average charge per visit that indicated no significant change of the average charge owing to the normal change over time.

Regarding relative effects among the independent variables explained by the value of standardized regression coefficient with statistical significance in the example equation mentioned, payment incentives had the strongest effect on the average charge per visit. The standardized regression coefficients value were 1.02 (beta4) and 0.28 (beta4) for the dummy variable of FFS and SSS, respectively. The lowest effect was the level change after the policy implementation with the standardized regression coefficient value -0.14.

For the parameter of model summary, R^2 value 0.855 and adjusted R^2 value 0.851 identified the good fit of the model. However, the statistical significance of DW identified the existing of autocorrelation.

Average charge of drug per visit of diabetic outpatients (Table 4.4)

Hospital 1

With regards to the CAP:30B-GB patients, the level of the average charge was about 567.96 baht per visit at the first month of the series and abruptly collapsed, about 229.94 baht per visit with the highest statistical significant influence ($beta_3$ = -0.93, the highest among beta value of other independent variables), after the 30-Baht Policy implementation. For FFS patients, the started level was 964.30 baht, which was almost twice higher than the level for the CAP:30B-GB patients. After the

30-Baht policy implementation was instigated, the average charge for the FFS patients rose up with a rate of 11.27 baht per visit per month whereas for the both remainder were constant.

About the CAP:SSS patients, the started level was 611.55 baht per visit, which was comparable to the CAP:30B-GB patients. After the 30Baht Policy implementation, there was an increasing like the FFS patients but with the different rate of 6.26 baht per month. When the average charge for overall patients, with the dummy scheme variables included in the regression equation, the average charge for the FFS and the CAP:SSS patients were statistical significant higher than for the CAP:30B-GB patients around 508.73 and 138.36 baht per visit, respectively. However, this regression equation faced a problem of autocorrelation of the error term.

Hospital 2

The average charge of drug per visit for patients in all three schemes had similar patterns in terms of no statistical significant changes in both level and trend with the strongest effect of natural increasing trend over time. The values of regression coefficient of baseline trend were highest with statistical significant and rates of changes for the CAP:30B-GB, the FFS, and the CAP:SSS patients were 5.65, 11.93, and 7.13 baht per visit, respectively. The differences in the first end level in baht per patient was also found: 380.82 for the CAP:30B-GB patients, 541.59 for the FFS patients, and 177.24 for the CAP:SSS patients. For the influence of types of schemes, the average charge for the FFS patients was statistical significant higher than for the CAP:30B-GB patients around 366.05 baht per visit, while for the CAP:SSS patients was lower than for the CAP:30B-GB patients around 163.49 baht per visit.

Hospital 3

For the CAP:30B-GB patients, the average charge of drug per visit seemed to have a lowest level at the first month of series with sustained growth, nevertheless, this linear regression model was not statistical significant. About the average charge for the FFS patients, the pattern was not able to be described owing to an autocorrelation problem with statistical significant Durbin-Watson test. For the CAP:SSS patients, the average charge had the first level at 618.98 baht per visit with an immediate increase about 277.98 baht per visit right after the 30-Baht Policy implementation. However, according to the plot, the variation appeared to be very high with many outliers. Possible reasons for this were due to the small number of visits in the series, 20-80 visits per month, and the outliers included visits with high cost drugs such as erythropoietin injection, according to the raw data.

Concerning the average charge for overall diabetic patients, the level had a statistical significant sudden drop about 107.63 baht per visit right after the policy instigation. For the influence of schemes, the average charge for the FFS and the CAP:SSS patients was statistical significant higher than for the CAP:30B-GB patients about 503.23 and 323.50 baht per patient, respectively.

Hospital 4

For the CAP:30B-GB patients, the average charge of drug per visit decreased in trend of change with a rate of 6.97 baht per visit per month other than the baseline trend. For the FFS patients, the level of the average charge seemed to increase suddenly about 96.75 baht per visit whereas the trend seemed to decrease gradually about 12.91 baht per month. However, this linear regression model was not fit because of the low R^2 value and the autocorrelation of error terms. In relation to the CAP:SSS patients, the average charge had a trend with an increasing rate of 5.06 baht per visit per month and a sudden drop about 88.20 baht per visit after the policy was implemented. As for the overall patients, the average charge for FFS patients was statistically significant higher than for CAP:30B-GB patients about 237.32 baht per visit whereas the average charge for the CAP:SSS patients was lower than for the CAP:30B-GB patients about 67.84 baht per visit.

Table 4.4 Segmented regression analysis results for average charge per visit

Hosp.	Payment	Constant		BT			LCAP			TCAP			FFS			SSS			R^2	Adj.R^2	DW
		b_0	SE	b_1	SE	$beta_1$	b_2	SE	$beta_2$	b_3	SE	$beta_3$	b_4	SE	$beta_4$	b_5	SE	$beta_5$			
1	CAP:30B-GB	***567.96****	19.73	-0.60	0.96	-0.08	***-229.94****	30.60	-0.93	2.14	1.94	0.13							0.796	0.784	1.567
	CAP:SSS	***611.55****	17.54	-1.34	0.85	-0.39	6.172	27.20	0.05	***6.26****	1.72	0.80							0.555	0.308	2.304
	FFS	***964.30****	19.64	-1.82	0.95	-0.35	22.15	30.46	0.12	***11.27****	1.93	0.96							0.616	0.595	1.792
	Overall	***498.91****	20.52	-1.25	0.88	-0.09	***-67.21****	28.09	-0.14	***6.56****	1.78	0.21	***508.73****	16.72	1.02	***138.36****	16.72	0.28	0.855	0.851	0.747*
2	CAP:30B-GB	***380.82****	32.10	***5.65****	1.65	0.88	-18.57	47.04	-0.08	-2.92	2.77	-0.23							0.387	0.354	1.593
	CAP:SSS	***177.24****	61.73	***7.13****	3.17	0.64	-72.77	90.47	-0.19	0.14	5.33	0.01							0.244	0.203	2.022
	FFS	***541.59****	51.99	***11.93****	2.67	0.86	-38.68	76.19	-0.08	0.69	4.49	0.02							0.658	0.639	1.741
	Overall	***299.03****	34.54	***8.23****	1.58	0.49	-43.34	45.05	-0.07	-0.70	2.65	-0.02	***366.05****	27.29	0.59	***-163.49****	27.29	-0.26	0.745	0.738	1.668
3	CAP:30B-GB[a]	***427.92****	23.99	-3.80	1.91	-1.05	4.10	29.66	0.04	***5.66****	2.19	1.08							0.129	0.074	1.969
	CAP:SSS	***618.98****	73.27	-3.75	5.83	-0.30	***277.98****	90.58	0.72	2.29	6.68	0.13							0.325	0.283	1.854
	FFS[b]	***739.37****	30.01	4.01	2.39	0.53	40.82	37.10	0.17	1.77	2.74	0.16							0.691	0.671	1.468*
	Overall	***319.85****	33.24	-1.18	2.43	-0.07	***107.63****	37.71	0.21	3.24	2.78	0.14	***503.23****	22.90	0.96	***323.50****	22.90	0.62	0.784	0.777	1.461
4	CAP:30B-GB	***253.02****	12.14	***5.98****	0.76	2.08	-22.72	16.11	-0.24	***-6.97****	0.98	-1.50							0.621	0.600	1.570
	CAP:SSS	***254.79****	28.32	1.32	1.77	***0.27***	***-88.20****	37.56	-0.53	***5.06****	2.28	0.63							0.298	0.260	1.305*
	FFS	***474.58****	26.35	***6.07****	1.64	1.12	***96.75****	34.95	0.53	***-12.91****	2.12	-1.47							0.500	0.473	1.202*
	Overall	***270.97****	17.62	***4.46****	1.00	0.49	-4.72	21.15	-0.02	***-4.94****	1.28	-0.34	***237.32****	12.96	0.74	***-67.84****	12.96	-0.21	0.795	0.789	0.910*

* means statistical significance with $p<0.05$

R^2 means coefficient of determination, a parameter for an expression of explanatory power of the regression equation. The higher value of R^2 indicates better of the prediction of the dependent variable. The higher value of R^2 indicates better of the prediction of the dependent variable.

Adj.R^2 means an amended version of R^2 concerning number of independent variables in the regression equation and the sample size

DW means Durbin-Watson statistic that measured the autocorrelations of errors in a series. The statistical significance of DW specifies the existing of autocorrelations of errors.

[a] not a statistical significance linear regression model (F=2.362, sig.=0.083)

[b] with stepwise procedure

Proportion of charge of NON-ED drugs per charge of all drugs prescribed for diabetic outpatients (Table 4.5)

Hospital 1

For the CAP:30B-GB patients, the proportion of charge of non-ED drugs per visit per month seemed to decline abruptly in level about 0.056, however, this regression faced a problem of overall model fit with low R^2 value 0.212. For the FFS patients, the proportion increased in trend after the policy implementation about 0.006 monthly. For the CAP:SSS patients, the similar trend pattern to the proportion for the FFS patients was observed with a different rate of 0.003, however, the overall unfit regression model with R^2 value 0.121 was detected. For overall patients, the proportion for the FFS and the CAP:SSS patients seemed to be higher than for the CAP:30B-GB patients around 0.203 and 0.112, respectively. Anyway, this model also faced a problem of autocorrelation.

Hospital 2

For the CAP:30B-GB patients, the linear regression model of the proportion of charge of non-ED drugs per visit was not statistical significant, so it was not able to use for the explanation. For the FFS patients, the proportion seemed to increase gradually in trend with a rate of 0.006 monthly, however, a problem of autocorrelation was found. For the CAP:SSS patients, the statistical significant changes in the level, an abrupt drop of 0.123, and the trend, with an increasing rate of 0.009 monthly. Nonetheless, a problem of autocorrelation of the error terms was observed. For the CAP:SSS patients, there were statistical significant changes in level, with a drop of 0.123, and in trend with an increasing rate of 0.009. Regarding for the overall patients, the proportion for the FFS patients seemed to be higher than for the CAP:30B-GB patients about 0.082, while the proportion for the CAP:SSS patients seemed to be comparable to the CAP:30B-GB patients. A problem of autocorrelation of error terms was also identified.

Hospital 3

Regarding the CAP:30B-GB patients, the proportion of charge of non-ED drugs per visit per month appeared to decrease in both the trend and level of changes after the policy implementation. However, problems of nonlinearity and autocorrelation of error terms was determined. For the FFS patients, there was no change in trend and level after the policy while an increasing trend with a rate of 0.004 monthly was found. As for the CAP:SSS patients, other than the increasing of baseline trend, the decreasing in trend change after the policy implementation with a rate of 0.013 seemed to be noticed. Anyway, a problem of very low R^2 value, 0.289, was found. For overall patients, the proportion for the FFS patients seemed to be higher than for the CAP:30B-GB patients around 0.080 monthly, but the regression model also had a problem of autocorrelation of error terms.

Hospital 4

About the CAP:30B-GB patients, the proportion of charge of non-ED drugs per visit per month had a statistical significant increasing of baseline trend

about 0.002 monthly, while the trend after the policy implementation decreased with a rate of 0.01 monthly. For the FFS patients, the proportion had an increasing trend change after the policy implementation with a rate of 0.006 monthly but an autocorrelation problem was found. For the CAP:SSS patients, only the constant of level, about 0.058, at the first month of data series was statistical significant. For overall patients, the proportion for the FFS patients seemed to be higher than for the CAP:30B-GB patients about 0.080 monthly whereas the autocorrelation problem was also found.

Table 4.5 Segmented regression analysis results for proportion of charge of NON-ED drugs per visit

Hosp.	Scheme	Constant		BT			LCAP			TCAP			FFS			SSS			R^2	Adj.R^2	DW
		b_0	SE	b_1	SE	$beta_1$	b_2	SE	$beta_2$	b_3	SE	$beta_3$	b_4	SE	$beta_4$	b_5	SE	$beta_5$			
1	CAP:30B-GB	***0.118****	0.011	0.000	0.001	0.157	***-0.056****	0.017	-0.818	0.002	0.001	0.390							0.212	0.169	1.956
	CAP:SSS	***0.252****	0.012	***-0.001****	0.001	-0.695	0.008	0.018	0.119	***0.003****	0.001	0.552							0.121	0.073	2.202
	FFS	***0.195****	0.007	***0.004****	0.000	0.864	-0.010	0.011	-0.064	***0.002****	0.001	0.180							0.933	0.929	1.976
	Overall	***0.083****	0.011	0.001	0.000	0.159	-0.019	0.015	-0.096	***0.002****	0.001	0.157	***0.203****	0.009	0.976	***0.112****	0.009	0.538	0.767	0.760	0.752*
2	CAP:30B-GB[a]	***0.117****	0.014	0.001	0.001	0.344	-0.029	0.020	-0.364	0.001	0.001	0.282							0.119	0.072	2.228
	CAP:SSS	***0.080****	0.031	0.002	0.002	0.284	***-0.123****	0.045	-0.577	***0.009****	0.003	0.751							0.374	0.340	1.647
	FFS	***0.206****	0.022	-0.001	0.001	-0.279	0.024	0.033	0.156	***0.006****	0.002	0.709							0.363	0.329	1.115*
	Overall	***0.107****	0.016	0.000	0.001	0.085	***-0.043****	0.021	-0.242	***0.006****	0.001	0.550	***0.082****	0.013	0.441	0.000	0.013	-0.001	0.397	0.379	1.401*
3	CAP:30B-GB	***0.040****	0.007	***0.004****	0.001	2.640	***-0.033****	0.009	-0.712	***-0.005****	0.001	-2.178							0.519	0.489	1.475*
	CAP:SSS	0.040	0.033	***0.010****	0.003	1.861	-0.057	0.041	-0.338	***-0.013****	0.003	-1.672							0.289	0.245	2.146
	FFS	***0.137****	0.015	***0.004****	0.001	0.788	-0.008	0.019	-0.045	0.002	0.001	0.184							0.857	0.849	1.822
	Overall	-0.013	0.018	***0.006****	0.001	0.907	-0.033	0.020	-0.155	***-0.005****	0.002	-0.555	***0.185****	0.012	0.844	***0.071****	0.012	0.323	0.640	0.628	1.107*
4	CAP:30B-GB	***0.076****	0.006	***0.002****	0.000	1.571	-0.016	0.008	-0.317	***-0.001****	0.001	-0.627							0.603	0.581	2.091
	CAP:SSS	***0.058****	0.019	0.002	0.001	0.706	0.003	0.025	0.026	-0.002	0.002	-0.355							0.184	0.138	1.929
	FFS	***0.080****	0.017	0.002	0.001	0.274	0.028	0.023	0.122	***0.006****	0.001	0.565							0.858	0.850	1.008*
	Overall	***0.050****	0.014	***0.002****	0.001	0.417	0.005	0.017	0.029	0.001	0.001	0.121	***0.080****	0.011	0.448	-0.015	0.011	-0.086	0.555	0.542	0.684*

* means statistical significance with $p<0.05$

R^2 means coefficient of determination, a parameter for an expression of explanatory power of the regression equation. The higher value of R^2 indicates better of the prediction of the dependent variable. The higher value of R^2 indicates better of the prediction of the dependent variable.

Adj.R^2 means an amended version of R^2 concerning number of independent variables in the regression equation and the sample size

DW means Durbin-Watson statistic that measured the autocorrelations of errors in a series. The statistical significance of DW specifies the existing of autocorrelations of errors.

[a] not a statistical significance linear regression model (F=2.525, sig.=0.067)

Proportion of visits of patients with specific originator drug items prescribed for diabetic outpatients in each health insurance scheme (Table 4.6)

Oral antidiabetic drugs: Thiazolidinedione (4 hospitals)

The data of 4 hospitals from May to December, 2003 was included in the analysis because the data of the CAP:30B-GB and the CAP:SSS patients was available for that period of time. The proportion of visits of patients with Thiazolidinedione drug for the FFS and the CAP:SSS patients was higher than for the CAP:30B-GB patients around 0.029 and 0.003 monthly, respectively. However, the proportion of visits for the FFS patients seemed to be a great deal highest proportion compared to the rest two schemes.

Antihypertensive drugs: Angiotensin II antagonists and combinations (4 hospitals)

The data of 4 hospitals from 2001 to 2003 was included in the analysis. For the CAP:30B-GB patients, the proportion of visits of patients with Angiotensin II antagonists and combinations had an increasing trend after the 30-Baht Policy implementation with a rate of 0.001 monthly, statistical significantly. As for the FFS patients, there was an increasing baseline trend with a rate of 0.002 monthly. About the CAP:SSS patients, there was a decreasing trend after the policy implementation with a rate of 0.003 monthly, while the baseline trend with a rate of 0.002 was found. For the effect of the schemes in the overall patients, the proportion for the FFS and the CAP:SSS patients were statistical significant higher than for the CAP:30B-GB patients about 0.057 and 0.023 monthly, respectively. However, an autocorrelation problem was found.

Serum lipid reducing drugs: HMG CoA reductase inhibitors (statins) (4 hospitals)

For the CAP:30B-GB patients, the level of the proportion seemed to had a spectacular drop around 0.296 after the 30-Baht Policy implementation. For the FFS patients, the policy implementation seemed not to influence the proportion, in both level and trend. For the CAP:SSS patients, there were effects of the policy implementation on both level, with a dramatic drop about 0.129 monthly, and trend, with an increasing rate of 0.040. For the effect of the schemes in overall patients, the proportion for only the FFS patients was statistical significant higher than for CAP:30B-GB patients about 0.178. However, the problem of autocorrelation of error terms was found in all mode except for the CAP:SSS patients.

Platelet aggregation inhibitors: clopidogrel and ticlopidine (3 hospitals)

The data of 3 hospitals form 2002 to 2003 was included in the analysis. The proportion of visits with clopidogrel or ticlopidine for the FFS and the CAP:SSS

patienets were statistical significant higher than for CAP:30B-GB patients (0.082 and 0.023 monthly, respectively).

Table 4.6 Segmented regression analysis results for proportion of visits with original high cost drugs

Drug	Scheme	Constant		BT			LCAP			TCAP			FFS			SSS			R^2	Adj.R^2	DW
		b_0	SE	b_1	SE	$beta_1$	b_2	SE	$beta_2$	b_3	SE	$beta_3$	b_4	SE	$beta_4$	b_5	SE	$beta_5$			
TZD	Overall	-0.003	0.005	0.000	0.000	0.023							***0.029****	0.001	1.038	***0.003****	0.001	0.095	0.988	0.986	1.859
A2A	CAP:30B-GB	***0.015****	0.003	0.000	0.000	-0.634	-0.004	0.003	-0.313	***0.001****	0.000	1.499							0.558	0.516	1.666
	CAP:SSS	***0.013****	0.006	***0.002****	0.001	1.841	0.012	0.007	0.408	***-0.003****	0.001	-1.978							0.494	0.447	2.629
	FFS	***0.030****	0.006	***0.002****	0.001	0.818	-0.001	0.007	-0.014	0.000	0.001	0.135							0.880	0.869	1.884
	Overall	-0.007	0.005	0.001	0.001	0.484	0.002	0.006	0.036	-0.001	0.001	-0.155	***0.057****	0.003	0.916	***0.023****	0.003	0.361	0.774	0.763	0.770*
Statins	CAP:30B-GB	***0.991****	0.067	-0.017	0.009	-0.477	***-0.296****	0.075	-0.368	-0.008	0.010	-0.170							0.927	0.920	0.513*
	CAP:SSS	***1.013****	0.055	***-0.046****	0.007	-1.894	***-0.129****	0.061	-0.238	***0.040****	0.008	1.283							0.891	0.881	2.494
	FFS	***1.027****	0.043	***-0.023****	0.006	-0.960	-0.075	0.048	-0.142	0.004	0.006	0.120							0.930	0.924	0.475*
	Overall	***0.952****	0.045	***-0.029****	0.006	-0.964	***-0.167****	0.047	-0.252	0.012	0.006	0.312	***0.178****	0.028	0.269	-0.003	0.028	-0.005	0.865	0.858	0.657*
clopidogrel and ticlopidine	Overall	***-0.011****	0.004	***0.001****	0.000	0.328							***0.032****	0.004	0.721	***0.023****	0.004	0.515	0.522	0.501	1.489

* means statistical significance with $p<0.05$

R^2 means coefficient of determination, a parameter for an expression of explanatory power of the regression equation. The higher value of R^2 indicates better of the prediction of the dependent variable. The higher value of R^2 indicates better of the prediction of the dependent variable.

Adj.R^2 means an amended version of R^2 concerning number of independent variables in the regression equation and the sample size

DW means Durbin-Watson statistic that measured the autocorrelations of errors in a series. The statistical significance of DW specifies the existing of autocorrelations of errors.

Part V Patterns of care process

Findings of this part of study involve patterns of physicians' orders in care process for requisite laboratory tests and physical examinations to monitor disease progression, diabetic complications, and outcomes of drug and other therapies. Frequencies of most of these procedures were compared to the recommendation criteria of the diabetic care guidelines. Comparisons of different intensities of the monitoring procedure among schemes and before and after the 30-Baht policy implementation were performed. Statistical significance for the comparison was calculated with ANOVA statistics for the average percentage of visits with fasting plasma glucose (FPG) test and blood pressure (BP) measurements per all diabetes visits of individual diabetic patient. Chi-square test was computed for the evaluation of percentage of patients in each health insurance scheme who were requested for laboratory test, including HbA1c, lipid profile, serum creatinine, and micrialbuminuria test, and physical examinations, including foot and dilated eye examinations. In addition, the same statistical tests were analyzed to compare differences between the year before (1999) and after (2003) the 30-Baht Policy implementation in order to determine the potential corollary of the policy. The number of sample of medical records in this part of study and a summary of statistical analysis is illustrates in Table 4.7 and Table 4.8, respectively.

Table 4.7 Number of sample of medical records

Scheme	Hospital 1		Hospital 2		Hospital 3		Hospital 4	
	Before (1999)	After (2003)	Before (1999)	After (2003)	Before (1999)	After (2003)	Before (1999)	After (2003)
CAP:30B-GB	30	30	30	30	30	30	30	30
CAP:SSS	30	30	22	30	8	30	24	30
FFS	30	30	30	30	30	30	30	30
Total	90	90	82	90	68	90	84	90

The hospital number (HN) of the diabetic outpatients in the database used in Part II was randomly selected to search for 30 medical records of patients in each scheme at the year before (1999) and after (2003) the 30-Baht Policy implementation. However, for CAP:SSS patients in the year 1999 of Hospital 2, 3, and 4 were successfully recruited for only 22, 8, and 24 patients, respectively. The reasons were that the overall number of CAP:SSS patients was a very small and the unobtainable medical records was for the patients who were absent from the hospital for 5 consecutive years, although all of the HNs were searched for.

Table 4.8 Percentage of patients with required laboratory tests and physical examinations meeting with the ADA recommendations (Chi-square tests)
[excepting fasting plasma glucose test and blood pressure measured that shown as average percentage of visits with the procedures with ANOVA statistical tests)

Process	Scheme	Hospital 1			Hospital 2			Hospital 3			Hospital 4		
		Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]
Laboratory Test													
– Glycemic monitoring													
• HbA1C	CAP:30B-GB	0	0	--	3.3	10.0	0.301	30.0	10.0	0.053	10.0	16.7	0.448
	FFS	0	6.7	0.150	16.7	10.0	0.448	20.0	40.0	0.091	16.7	20.0	0.739
	CAP:SSS	0	0	--	0	0	--	25.0	30.0	0.782	4.2	13.3	0.248
p-value[c]		--	0.129		***0.043****	0.200		0.670	***0.028****		0.332	0.787	
• Fasting plasma glucose[a]	CAP:30B-GB	99.3	90.3	***0.000****	92.1	95.7	0.308	95.9	95.2	0.781	98.4	95.3	0.321
	FFS	96.4	96.3	0.682	94.3	92.1	0.499	92.9	93.6	0.860	95.1	97.8	0.469
	CAP:SSS	93.5	89.0	0.289	99.2	99.2	0.078	95.3	91.9	0.544	96.7	94.5	0.470
p-value[c]		0.131	0.520		0.105	0.105		0.600	0.657		0.608	0.562	
– Hyperlipidemia monitoring													
• Total cholesterol	CAP:30B-GB	73.3	63.3	0.403	36.7	86.7	***0.000****	16.7	23.3	0.519	10.0	66.7	***0.000****
	FFS	66.7	63.3	0.787	66.7	86.7	0.067	46.7	66.7	0.118	26.7	46.7	0.108
	CAP:SSS	46.7	60.0	0.301	27.3	46.7	0.156	25.0	63.3	0.053	16.7	63.3	***0.001****
p-value[c]		0.086	0.954		***0.009****	***0.000****		***0.039****	***0.001****		0.238	0.241	

Table 4.8 Percentage of patients with required laboratory tests and physical examinations meeting with the ADA recommendations (Chi-square tests) [continued]

[excepting fasting plasma glucose test and blood pressure measured that shown as average percentage of visits with the procedures with ANOVA statistical tests)

Process	Scheme	Hospital 1			Hospital 2			Hospital 3			Hospital 4		
		Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]
• Triglyceride	CAP:30B-GB	73.3	56.7	0.176	36.7	86.7	***0.000****	16.7	23.3	0.519	10.0	66.7	***0.000****
	FFS	66.7	63.3	0.279	60.0	86.7	***0.020****	46.7	63.3	0.194	26.7	46.7	0.108
	CAP:SSS	46.7	56.7	0.174	27.3	50.0	0.099	25.0	56.7	0.111	16.7	60.0	***0.001****
p-value[c]		0.086	0.832		***0.044****	***0.001****		***0.039****	***0.004****		0.238	0.279	
• HDL-cholesterol	CAP:30B-GB	56.7	40.0	0.196	30.0	43.3	0.284	10.0	23.3	0.166	10.0	66.7	***0.000****
	FFS	40.0	46.7	0.602	40.0	56.7	0.196	26.7	46.7	0.108	10.0	46.7	***0.002****
	CAP:SSS	16.7	33.3	0.136	22.7	26.7	0.746	0	43.3	***0.022****	16.7	53.3	***0.006****
p-value		***0.006****	0.574		0.404	0.062		0.090	0.131		0.695	0.284	
• LDL-cholesterol	CAP:30B-GB	20.0	20.0	1.000	16.7	43.3	***0.024****	0	0	--	0	63.3	***0.000****
	FFS	13.3	3.3	0.161	26.7	56.7	***0.018****	0	16.7	***0.020****	0	36.7	***0.000****
	CAP:SSS	6.7	16.7	0.228	13.6	16.7	0.765	0	3.3	0.601	0	46.7	***0.000****
p-value[c]		0.315	0.133		0.446	***0.005****		--	***0.024****		--	0.113	
– Nephropathy monitoring													
• BUN	CAP:30B-GB	53.3	36.7	0.194	50.0	60.0	0.436	13.3	23.3	0.317	13.3	30.0	0.117
	FFS	43.3	43.3	1.000	60.0	36.7	0.071	13.3	30.0	0.117	26.7	20.0	0.542
	CAP:SSS	16.7	26.7	0.347	68.2	43.3	0.076	0	33.3	0.057	16.7	23.3	0.546
p-value[c]		***0.010****	0.398		0.413	0.175		0.546	0.685		0.396	0.656	

Table 4.8 Percentage of patients with required laboratory tests and physical examinations meeting with the ADA recommendations (Chi-square tests) [continued]

[excepting fasting plasma glucose test and blood pressure measured that shown as average percentage of visits with the procedures with ANOVA statistical tests)

Process	Scheme	Hospital 1			Hospital 2			Hospital 3			Hospital 4		
		Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]
• Serum creatinine	CAP:30B-GB	53.3	43.3	0.438	53.3	70.0	0.184	20.0	43.3	0.052	33.3	63.3	***0.026****
	FFS	43.3	43.3	1.000	60.0	50.0	0.436	16.7	53.3	***0.003****	43.3	40.0	0.793
	CAP:SSS	16.7	26.7	0.347	68.2	53.3	0.281	0	63.3	***0.001****	33.3	43.3	0.454
p-value[c]		***0.010****	0.307		0.559	0.244		0.392	0.300		0.661	0.148	
• Microalbuminuria	CAP:30B-GB	0	0	--	0	0	--	0	0	--	0	0	--
	FFS	0	0	--	3.3	0	0.313	0	0	--	0	0	--
	CAP:SSS	0	0	--	0	3.3	0.387	0	6.7	0.453	0	0	--
p-value[c]		--	--		0.416	0.364		--	0.129		--	--	
Physical Examination													
– Retinopathy monitoring													
• Dilated eye examination	CAP:30B-GB	6.7	26.7	0.038*	26.7	23.3	0.766	20.0	43.3	0.052	13.3	16.7	0.718
	FFS	16.7	33.3	0.136	16.7	23.3	0.519	23.3	30.0	0.559	26.7	26.7	1.000
	CAP:SSS	16.7	13.3	0.718	13.6	6.7	0.400	0	26.7	0.100	12.5	6.7	0.720
p-value[c]		0.421	0.186		0.446	0.150		0.325	0.350		0.290	0.115	

Table 4.8 Percentage of patients with required laboratory tests and physical examinations meeting with the ADA recommendations (Chi-square statistical tests) [continued]

[excepting fasting plasma glucose test and blood pressure measured that shown as average percentage of visits with the procedures with ANOVA statistical tests)

Process	Scheme	Hospital 1			Hospital 2			Hospital 3			Hospital 4		
		Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]	Before (1999)	After (2003)	p-value[b]
– Peripheral neuropathy monitoring													
• Foot examination	CAP:30B-GB	0	0	--	0	3.3	0.313	3.3	0	0.313	0	3.3	0.313
	FFS	0	0	--	20.0	0	***0.010****	0	0	--	0	0	--
	CAP:SSS	0	0	--	4.5	0	0.238	0	0	--	0	0	--
p-value[c]		--	--		***0.016****	0.364		0.526	--		--	0.364	
– Hypertention monitoring													
• Blood pressure measured[a]	CAP:30B-GB	94.4	87.4	0.008	89.4	97.7	0.077	99.0	99.2	0.810	97.6	96.8	0.769
	FFS	92.0	94.1	0.435	90.6	93.0	0.556	92.7	92.1	0.900	96.2	93.9	0.609
	CAP:SSS	92.8	95.5	0.369	95.0	85.8	***0.040****	94.0	95.7	0.703	87.1	97.8	***0.043****
p-value[c]		0.757	0.078		0.565	***0.003****		0.240	0.102		0.080	0.506	

[a] ANOVA tests

[b] p-value of statistically different tests between the year before (1999) and after (2003) the 30-Baht Policy implementation for each health insurance scheme

[c] p-value of statistically different tests among health insurance schemes for each year before (1999) or after (2003) the 30-Baht Policy implementation

* statistical significant ($p < .05$)

Regarding glycemic monitoring, patients in all schemes tended to obtain HbA1c tests less than twice a year, 0-40%, especially for almost none of all patients in Hospital 1. More FFS patients in Hospital 2 and 3 received the tests twice a year, according to the ADA 1999 and 2003 that recommended this test for all diabetic patients, than the other patients, statistically. For FPG tests, more than 89% of visits of patients were ordered the tests with no statistically different among schemes and between before and after the 30-Baht Policy implementation, except for the CAP:30B-GB patients of Hospital 1 before the policy implementation. Although the FPG test was an optional recommendation of the ADA (1999) and not mentioned in the ADA (2003) standard treatments, the FPG test seemed to be the only one clinical parameter available for glycemic monitoring that should be considered in the situation of infrequent HbA1c tests.

For hyperlipidemia monitoring, a test of lipid profiles, including total cholesterol, triglyceride, HDL-cholesterol, and LDL-cholesterol, should be performed at least once yearly for every diabetic patient according to the guidelines of the ADA 1999 and 2003. There was statistically significant higher in percentage of FFS patients with the test at least once yearly than patients under the other schemes in Hospital 2 and 3. HDL-cholesterol tests seemed to be ordered lower than the total cholesterol and triglyceride tests, while LDL-cholesterol tests were slightest considered.

About hypertension monitoring, blood pressure measures were recommended for every visit of diabetic patients, according to the ADA guidelines 1999 and 2003. In all 4 hospitals, this type of measure was done for visits of patients with a very high rate. Health insurance schemes seemed to have no effect on the rate of measurement, except for Hospital 2 and Hospital 4.

For nephropathy monitoring, the microalbuminuria test and serum creatinine test were recommended at least once yearly for every diabetic patient, according to the ADA guidelines 1999 and 2003. Astonishingly, almost none of all patients in all four hospitals were taken the microalbuminuria test into consideration. Although it is the most important clinical parameter for renal complication monitoring, the scarcely accessible to this required test might be due to the cost of the test. With regard to the serum creatinine test, the percentage of patients with this test at least once daily was higher and not affected by the schemes.

Concerning retinopathy monitoring, the dilated eye examination was recommended at least once yearly for every diabetic patient, according to the ADA guidelines 1999 and 2003. This sort of examination was performed in quite slight number of patients in every hospital and every scheme and the implementation of the 30-Baht Policy had no statistically significant effect.

As for peripheral neuropathy monitoring, the foot examination was recommended at least once yearly for every diabetic patient, according to the ADA guidelines 1999 and 2003. There were hardly any patients with this examination that conformed to the guidelines except for FFS patients in Hospital 2 in 1999.