CHAPTER II

LITERATURE REVIEW

This chapter contains reviews of related literature on payment incentives of health insurance systems and assessments. The contents are organized into three parts –studies on payment incentives of health insurance systems in foreign countries, studies on payment incentives of health insurance systems in Thailand, and Shorrock index of order 2 – a measurement of equity care.

Studies on Payment Incentives of Health Insurance Systems in Foreign Countries

Many studies have revealed that health insurance systems with various payment methods had different impacts on quality of care, efficiency of health care services, and health care expenditures. Methodologies for assessing these impacts were reviewed as follow:

Effects of payment methods on quality of care

It's a well-known fact that payment methods of health insurance system have had effects on quality of care. Therefore, there are many studies that have had examined these effects (Anderson, et al., 2005, Tsai, et al, 2005, Shmueli, et al., 2002, and Shen, 2003. The fascination of these studies is not only the effects of payment methods on quality of care themselves but also their wide variety of quality indicators exploited to reflect the consequences. The reviews of the studies are illustrated as follows.

Quality indicators

Quality indicators of health care services provided by hospital providers were different among the studies. While some of the indicators measured process of health care services, some of them measured outcome of the services, for example

1. Length of stay (LOS)

   This kind of indicators could reflect quality of health care services but there was a limitation that long length of stay may not imply an advantage over short length of stay. Therefore, LOS alone is not normally used but it may be used together with other quality indicators. For example, Tsay, et al.(2005) used LOS together with number of optimal service items, number of drugs prescribed, and number of minimal required services

2. Number of drug item per prescription

   Similar to the LOS, the more number of drug items prescribed might not indicate the better quality of care, as reported in a study of Tsai, et al. (2005).

3. Complications of the studied diseases

   This indicator could reflect outcome quality of health care services but there were many confounders such as health status of patients that affect clinical outcomes of patients. Nevertheless, in general, superior quality of care should decrease opportunities to develop complications, as stated in a study of Shen (2003).

4. Readmission rates

   This indicator could indicate the outcome quality like the complications. The interested point of this indicator was the determination of period of time as a readmission. Conditions used to determine the readmission depended on many factors such as type of diseases and conditions of health insurance payer. Some definitions of readmission rates were
   - the 31-day post-discharge readmission rates (Anderson, et al. ,2005)
   - the 60-day post-discharge readmission rates (Shmueli, et al.,2002)

5. Mortality rates or survival rates

   This indicator also reflected outcome quality but the data collection for this indicator was complicated. In many studies, more than one health care database should be used in

order to obtain enough information for calculations of of rates. Shen, 2003 and Shmueli et al., 2002 used this indicator for outcome measurement.

Owing to lots of confounding factors that affect the use of these quality indicators, some studies uses more than one quality indicator, as shown in Table ?.1.

Sources of data

In many studies, data from many health care databases has had to be retrieved for determining of the quality indicators, for example

1. Medication records that provided data of characteristic of patients and readmission (Anderson, et al., 2005)

2. Claims database that provide data of characteristic of patients, readmission (Shmueli, et al., 2002), length of stay (Tsai, et al., 2005), number of optimal service items (Tsai, et al., 2005), number of drugs prescribed (Tsai, et al., 2005), number of minimal required services (Tsai, et al., 2005), and complications (Shen, 2003)

3. The Social Security Death record that provide data for calculation of mortality rates (Shen, 2003)

4. The population files of the Ministry level that provide data for calculation of mortality rates (Shmueli, et al., 2002)

Tracer diseases

Regarding investigation of effects of health insurance payment methods on quality of care provided by hospital providers, some studies have used tracer diseases to specify the effects (Shmueli, et al., 2002, Shen, 2003, and Tsai, et al. 2005), while some studies have not (Anderson, et al., 2005)

Table 2.1: Summaries quality indicator and source of data in foreign country

Author (year)	Tracer	Source of data	Quality indicator
Shmueli, et al. (2002)	✓	Hospital database	- readmission - mortality
Tsai, et al. (2005)	✓	claim database	- LOS - no. drug item/prescription
Shen (2003)	✓	claim database	- survival rate (1 year) - complication - mortality rate (during admission)
Anderson, et al. (2005)	×	Medication record	readmission

Effects of payment methods on efficiency of health care services

Generally, explorations of efficiencies of health care services need tracer diseases to identify the specific conditions.

Tools for efficiency study

In the studies of efficiency, many tools have been used, for example,

1. *Efficiency ratios and the morbidity index*

    Amy K., et al. (2003) determined whether the two case-mix measures resulted in different efficiencies of health care services across the network. A one year cross sectional study was carried out to compare unadjusted efficiency ratios, as an indicator of resource uses, and morbidity index, as an indicator of predicted model, of the Adjust Clinical Groups with of the Diagnostic Cost Group.

    - Source of data: the administrative database with the ICD-9-CM coding system for diagnosis was used for calculation of the efficiency ratios and the morbidity index.

    - Variable: unit cost

2. *Cost-effectiveness*

Lee (2004) reviewed empirical evidence of coronary care practices and described roles of financial incentives in shaping clinical practice patterns and practice efficiencies in treatments of cardiovascular diseases (CAD) and heart failure (HF). Furthermore, the study suggested that clinical cost-effectiveness research was suitable for assessments of the effects of financial incentives on the practice efficiencies because cost-effectiveness analyses compared costs and health outcome. However, cost reduction analyses were not recommended for assessments of the efficiencies of payment methods.

- Source of data: not stated
- Variable: cost
- Effectiveness: not stated,
  life-year saved, disability saved, and avoidable morbidity were recommended.

3. *Cost-benefit*

Shen (2003) conducted a cost-benefit study on treatments of acute myocardial infarction (AMI) in order to compare the financial pressure of the Medicare with the HMO.

- Source of data: The Medicare claims database of the entire 10-year period for AMI population was used for the calculations.
- Variable: The "cost" in the study was defined as savings that made by the third party and the "benefit" was defined as the monetary value of the loss of life *that* calculated under the equation below.
- Benefit: The number of deaths X quantity-adjusted life year (QALY)

Table 2.2: Summaries tools for measurement of efficiency in foreign country

Author (year)	Tracer	Source of data	Efficiency indicator
Amy K., et al. (2003) /	✓	claim database	*Efficiency ratios and*
Lee (2004) /	✓	-	Cost -effectiveness
Shen (2003)[10] /	✓	claim database	Cost-benefit

Effects of payment methods on health care expenditures

Normally, costs or charges of services have been used as an indicator under certain tracer disease conditions.

Indicators:

1. Hospital charge per case, drug charge per case, non-pharmacological treatment per case, surgical operation charge per case
2. Average expensive drug expenditures
3. Average high technology equipment expenditures

Source of data:

1. medical *records*
2. health insurance documents
3. interviews of policy makers
4. focus group discussions of hospital staffs
5. claim database

Table 2.3: Summaries source of data and indicator for measurement of expenditures in foreign country

Author (year)	Tracer	Source of data	indicator
Meng, et al. (2004)	✓	- medical records - health insurance documents - interviews of policy makers - focus group discussions of hospital staffs	charge per case
Yip and Eggleston (2004)	✓	claim database	average expenditure

Summaries of studies on effects of payment methods on quality of care, efficiency of health care services, and health care expenditures is shown in Table 2.4.

Table 2.4: Summaries of studies on effects of payment methods on quality of care, efficiency of health care services, and health care expenditures

Author (year) / [Topic]	Dependent variables	Independent variables	Tracers	Study design / Source(s) of data	Focus of each study
Shmueli, et al. (2002) / [The effect of introducing prospective payment to general hospital on length of stay, quality of care , and hospital income: the early experience of Israel]	− Volume of activity − Length of stay − Quality of care (readmission and mortarity rate) − Hospital income	Traditional cost-based per diem vs. a fixed prospective payment (per diem rate)	− Chlolectomy − Hysterectomy − Hip replacement − Operations on lens − heart surgeries	Cross-sectional study 2 yrs (Pre-post study) / − Hospitalization record − The Ministry of Interior's population file (mortality data)	Effects of payment methods on quality of care
Meng, et al. (2004) / [The impact of urban health insurance reform on hospital charges: a case study from two cities in China]	− Length of stay − Charges per case	Single payer vs. multiple payer	− Acute appendicitis − Childbirth	Cross sectional study (Pre-post study with a control group)/ multiple sources of data − Medical records − Health insurance documents − Policy makers interviews − Hospital staffs focus group discussions	Effects of payment methods on drug expenditures
Amy K., et al. (2003) / [Do different Case-Mix measures affect assessments of provider effceincy?]	− Efficiency (ratio)	Adjusted Clinical Groups vs. Diagnostic Cost Group	-	Cross sectional study (1 yr) / − Administrative database	Explanations of the methods for calculations of effceincy of care
Lee (2004) /	− Clinical practice	Fee-for-service	− Cardiovascul	Literature review	Explanations

Author (year) / [Topic]	Dependent variables	Independent variables	Tracers	Study design / Source(s) of data	Focus of each study
[The role of financial incentives in shaping clinical practice patterns and practice effceincy]	patterns and – Practice effceincy	vs. capitation	ar disease		of the methods for calculations of effceincy of care
Yip and Eggleston (2004) / [Addressing government and market failures with payment incentives: hospital reimbursement reform in Hainan, China]	– Expenditures of expensive drugs, high technology procedures and bed charges	Fee-for-service vs. prospective payment system	– Infectious disease – Tumor – Diseases of circulatory system – Diseases of respiratory system – Diseases of digestive system – Disease of urology and/or reproductive	Cross-sectional data (2 years) (Pre-post study with a control group) / – Claim data sources	Definitions of expensive drugs and high technology procedures
Shen (2003) / [The effect of financial pressure on the quality of care in hospitals]	– Quality of care 1) Mortarity 2) Complication rates – Effciency	Prospective payment system with case-mix index vs. cost-based reimbursement (HMO vs. Medicare)	– Acute myocardial infarction	Longitudinal study / – Claim database	Effects of payment methods on quality and effceincy of care
Anderson, et al. (2005)/ [Hospital Readmission from Home Health care	– Quality of care 1) Readmission	Prospective payment system	-	Longitudinal study / – Medical records – Nurses by interview	Effects of payment methods on

Author (year) / [Topic]	Dependent variables	Independent variables	Tracers	Study design / Source(s) of data	Focus of each study
Before and after prospective payment]					quality of care
Tsai, et al. (2005) / [The effect of changing reimbursement policies on quality of in-patient care, from fee-for-service to Prospective payment system]	– Quality of care 1) Length of stay 2) Number of optional service items 3) Number of drugs prescribed 4) Number of minimally required services	Fee-for-service vs. Prospective payment system	– Hemorrhoid ec-tomies	Cross-sectional data (9 months) / – Claim data sources	Effect of payment methods on quality of care

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In relation to all evidence reviewed above, it was illustrated that

1. *Data sources*: Most of the data was obtained from electronic health care databases of each hospital, such as claim databases. The other data was drawn mainly from medical records.

2. *Tracers*: Various diseases were used as representative conditions in each study.

3. *Identification of patients*: The ICD-9 coding system was exploited as markers to indicate patients in most of the studies.

4. *Techniques of economic evaluation*: Techniques of cost -effectiveness and cost-benefit were applied to assess efficiencies of health care services among different health insurance systems or payment methods.

5. *Effects of payment methods*: Prospective payment method had a tendency to reduce cost and quality of care.

Studies on Payment Incentives of Health Insurance Systems in Thailand

Effects of payment incentives of several health insurance systems in Thailand were addressed in numerous studies, especially after the 30-Baht Scheme of the universal health care coverage policy with close-ended payment methods was implemented in 2001 – 2002. The reviews of methodologies of the studies on effects of health insurance payment methods on access and equity in health care services, and quality of care are illustrated below including some other crucial concerns.

Effects of payment methods on access and equity in health care services

Studies on effects of payment methods on access and equity in health care services in Thailand have been assorted. Naranong, et al. (2003) compared benefit package of each health insurance scheme, while Limvattananon, et al. (2004) determined differences in prescribing among different health insurance schemes. Bryant and Prohmmo (2005) examined the differences in costs per prescription.

Indicator:

Indicators used in the studies were different from access to care which was the qualitative indicator for comparing of the inequities in benefit packages to costs per prescription which was the quantitative indicator for determining of rough magnitude of the inequities. However, there was no study on effects of payment methods on equities of access to health care services using economics equity indexes to depict the inequalities of the access. The details of the studies are shown in Table 2.5.

Sources of data:

Because there have been a wide variety of indicators used in the studies, the required sources of the data have been varied as well, as shown in Table 2.5.

Tracer:

Studies on effects of payment methods on equities of access to care in Thailand have not frequently used tracer diseases to specify the effects on the certain conditions. There is one study that used diabetes as a tracer disease for comparing of the access to drugs and yearly required physical examinations and laboratory tests (Kanchanaphibool, 2005).

Effects of payment methods on quality of care

Studies on effects of payment methods on quality of care in Thailand have used various indicators, including

Indicator

1. Rate of prescribing for required drug

    This indicator points toward the process of health care services. Limvattananon, et al. (2004) used a rate of inhalated corticosteroids prescribing as an indicator to measure quality of health care services provided to asthma patients

2. Complied with standard practice guidelines

    This indicator reflects clinical quality of health care services. Kanchanaphibool (2005) used ordering of glycosylated haemoglobin (HbA1c) tests for glycemic control in diabetic patients as an indicator to compare quality of diabetic care among patients with different health insurance schemes.

3. Mortality rates

    This indicator indicates outcome of health care services. Naranong, et al. (2003) used mortality rates, some problems with the sensitivity, and the interpretation of the mortarity rates to evaluate quality of care provided to patients with different health insurance schemes

Source of data:

    Most of the studies have used electronic health care databases of hospitals together with medication record documents.

Some other crucial concerns

1. Incompleteness of electronic databases

    Many studies in Thailand stated that claims data and ICD-10 diagnosis data have had lots of problems in terms of quality and completeness of the databases (Limvattananon, et al., 2004, Bryant and Prohmmo, 2005, Yupakdee and Pannarunothai, 2005, Chaiyakunaprek and Pannarunothai, 2005). This problem has been different from studies in other countries. It has been an remarkably significant issue that affects the research designs and validity of the research in this field of study in Thailand.

2. Different prices for different hospitals

To compare drug costs among more than one hospitals, the calculation of the standard drug costs should be considered cautiously, as shown in Table 2.5.

Table 2.5 Summaries of the studies on payment incentives of health insurance systems in Thailand

Author (year)	Study design / Source(s) of data	Index for measurement of dependent variables				Other crucial concerns
		Access and Equity	Quality of care	Effceincy	Related cost issue	
Naranong, et al. (2003)	Cross-sectional study (1 year) / Multiple sources of data - Literature review - Secondary data analysis - Interview - Focus group disccussion - Questionnaire	Benefit package	Mortarity rate	-	Adequacy of allocated budget of UC	-
Limvattananon, et al. (2004)	Cross-sectional study (3 years) / Two data sources - Electronic databases of hospitals - Questionaire	Rate of prescribing for new drugs: - ACE inhibitors - long-acting calcium channel blockers - statins - COX-2 inhibitors - proton pump inhibitors - protease inhibitors	Rate of prescribing for required drug - inhalated corticosteroids	-	Gap in the propensity to use new drugs between UC and CSMBS	- Incompleteness of electronic databases of hospital
Ngosurachej and Sonlerdlumvanich (2004)	Cross-sectional data (1 fiscal year) / National administrative data of 640 public hospitals	-	-	-	Inaptient-day and hospital revenue	-

Author (year)	Study design / Source(s) of data	Index for measurement of dependent variables				Other crucial concerns
		Access and Equity	Quality of care	Effceincy	Related cost issue	
Mills, et al. (2000)	Cross-sectional study / Multiple sources of data - Electronic databases of hospitals - Semi-structured interviews with managers and staffs - Literature reviews	Generic substitution policy	-	-	cost containment policy	-
Bryant and Prohmmo (2005)	Cross- sectional study (2 years) / Multiple sources of data - Treatment records - Interviews with and surveys of residents who live near hospitals	Cost per prescription	-	-	-	- Incomplete ICD-10 diagnosis data recorded in the databases - Different prices for different hospitals
Kanchanaphibol (2005)	Longitudinal study / Multiple sources of data - Electronic databases of hospitals - interviews with staffs - medication record	- Cost per prescription - Cost per prescription - Cost per prescription - Proportion of charge of non-ED drugs per charge of all drugs - Access to new	Complied with critical STGs	-	-	-

Author (year)	Study design / Source(s) of data	Index for measurement of dependent variables				Other crucial concerns
		Access and Equity	Quality of care	Effceincy	Related cost issue	
		drugs - Access to original drugs				
Yupakdee and Pannarunothai (2005)	Cross- sectional study (1 year) / Electronic databases of the 30-Baht Scheme	-	-	-	-	- Incomplete ICD-10 diagnosis data of outpatients with the 30-Baht Scheme
Chaiyakunaprek and Pannarunothai (2005)	Cross- sectional study / Multiple sources of data - Literature reviews - Electronic databases of the 30-Baht Scheme - A survey of other health databases	-	-	-	-	- Some limitations upon quality and completeness of the databases of the 30-Baht Scheme

With regard to all evidence reviewed above, gaps in knowledge of payment incentives of health insurance systems in Thailand was

1. To date, there is no study on incentives of payment methods on effceincy of health care services

2. Most of the studies have addressed only one or two dimensions of the payment incentives. To date, there is no study with assessements of all three major dimensions of payment incentives encompassed quality, equity and effecincy.

3. Frequently, quality and completeness of data recorded in the electronic databases of hospitals and health insurance payers were limited, especially the ICD-10 diagnosis data.

Shorrock Index of Order 2: A Measurement of Equity Care

In economic terms, inequality index is an indicator for measurement of unequal income, for example, Gini Index and Concentration Index. The indicies with the capabilities to impart consistent and desirable results must comply with the five imperative properties consisted of tranfer principle, scale independent, pupulation independent, anonymity, and decomposability. Israngkura (2003) described each property that

1. *Tranfer principle*: It was required that if incomes were transferred from the poor to the rich, the consequences would be an increase, at least no decrease, in inequality, and vice versa.

2. *Scale independent*: This attribute was that if incomes were changed into a uniform proportion, then inequality would not change.

3. *Pupulation independent*: This property was that if two identical populations were merged together, then inequality would not change.

4. *Anoymity*: This characteristic necessitated inequality measures with independence from any characteristics of individuals apart from their incomes.

5. *Decomposibility*: This feature requires that the total inequality must equal the sum of inequalities of between and within subgroups.

In the field of health care, some inequality indicies like the Gini Index and the Concentration Index were commonly applied. Although the Pan American Health

Oragnization's technical cooperation in the countires located in the American region recommended the Gini Index for the measurement of inequality in health, it was not completely complied with these five properties especially for the decomposibility. Sarntisart (2000) stated that the Gini Index was limited to the cases of intersecting lorenze curves and the index's non-aggreagte decomposable.

In contrast to Gini Index, the Shorrock Index of Order 2 perfectly fulfilled the five imperative properties, especially the decomposibility. In general terms, Shorrock Index means Shorrock Index of Order 2 (I_2) commonly used for the measurement of inequality incomes. Nonetheless, in the field of health care, it is scarcely applied. To date, in Thailand there is only one study using the Shorrock Index to measure inequality in health care (Kotjarus P, 2001). The study employed both Gini Index and Shorrock Index to measure the inequality in budget allocated for high cost care to public hospitals. However, findings of the study indicated that there was no significant difference between the calculated values of the Gini Index and of the Shorrock Index for assessments of the allocated budget.

The Shorrock index of order 2 (I_2) is defined as in the equation below.

$$I_2 = (1/2\ N)\ \Sigma\ [(Yi/M)-1]^2$$

Yi	=	set of income distribution among population
N	=	number of population
M	=	mean of income

Generally, ranging in value of the Shorrock Index is started at 0 to (N-1)/2, if N equals to the number of population.

$$0 \leq I_2 \leq (N-1)/2$$

For the meaning of the index, the higher value denotes the higher level of inequality.

Regarding the decomposibility of the Shorrock Index of Order 2 (I_2) (Isara, 2000), it is defined as the equation below.

$$I_2 = \Sigma_g\ V_g\ \delta^2_g\ I_{2g} + (1/2)\ \Sigma_g\ V_g\ [\delta_g -1]^2$$

V_g =   the ratio between population in group g and total population

δ^2 =   the ratio between mean of income in group g and mean of total income

I_2 =   inequality in group g

The equation above is the decomposition technique to identify factors affecting inequality. Bases on the equation, inequality can be devided into two parts as follows:

- The inequality among people inside the same subgroup, called within-group component
- The inequality among people in the different subgroups, called between-group component

For the meaning of the decomposition, the value of between-group component indicates degree of the subgroups' effects on the inequality. If the value of between-group component for the subgroup A is higher than for the subgroup B, it means that the subgroup A has higher effects on the inequality than the subgruoup B.