

CHAPTER 2

LITERATURE REVIEWS



To reach the goals of Health For All by the year 2000 health care sector must be implemented cost-effectively, especially given the severe constraints facing the health sector in many developing countries (Creese and Parker, 1993). Knowledge about the costs, both unit and total, can help in health care planning for future budgets as an indicator of efficiency and also can assist to establish a charge for patient services. A hospital can not set the price unless the cost finding system correctly allocates, direct and indirect costs, to appropriate cost centers (Sephard and others, 1997).

Collection and analysis of data on program's costs can provide considerable use-full information on health care services of all kinds (Creese and Parker, 1993). In addition to indicating the size of funds, from all sources, to be required to continue program to asses the use of personnel in delivery health care and the efficiency of putting supplies, transportation resources and others inputs to work as well. Cost finding or cost analysis is the process of manipulation and rearranging the existing cost data in order to get the cost of services given by the hospital or program. There are three important requirements of approaches to estimate as well as analyze the cost, namely cost classification, annual capital cost calculation, model or approach to allocate and analyze cost.

2.1 Cost Classification

Creese and Parker (1993) which is a training manual for program managers explained several types of cost classifications to readers. Creese and Parker described a good classification scheme depends on the needs of particular situation or problem and based on three conditions that are: it must be relevant to the particular situation, the classes or categories must not overlap and the classes chosen must cover all the possibilities.

Most of the studies were likely to classify the cost by inputs and function or activities such as a study of a methodology for the calculation of health care cost and

their recovery by Carrin and Elvo (1995), cost-effectiveness analysis of vector control in 1993 by Phillips and others, unit cost of diagnostic imaging tests at the outpatient department in Chulalongkorn Hospital by Pirom and others (1991), economics for health sector analysis by Over (1991) etc. Other classifications are classification by source, by level used of resources, by currency. Classification by source of the resources is that who provides them. It is also important because the donors need the report of expenditure used and the outcome of the spending or for future drains on national funds or for estimation how much multiplier effect of external assistance which the aid (Creese and Parker, 1993). Classification by level is according to the levels at which they are used. For example, some resources are used at the central or national level while others used for provincial, regional, or district level.

2.2 Methods to Allocate and Analyze Health Care Costs

A methodological study for the health care costs calculation and cost recovery was made by Carrin and Evlo in 1995. They developed a simulation model to analyze the costs of health care activities in a public health sector in order to evaluate the effects of health care reform being undertaken by government of Guinea. Under the reform the fee system was introduced but only to recover the recurrent non-salary cost in front of the socioeconomic constraints on the population. The study was a sensitivity analysis which changed some parameters such as inflation rate, demand growth and rate of the national currency depreciation from 1991 to 1993 to get the new scenarios of cost so that the new scenarios can be compared with the baseline scenarios.

Instead step down method is used in this study of unit cost estimation for outpatient and inpatient department in Nakloeung district hospital in order to introduce the fee system. This fee system in this study was different from Carrin and Elvo study because the charge with recover both capital and recurrent costs. The approach to calculate capital costs was modified from Carrin and Elvo study. It also changed some parameters such as labor cost and the volume of activities to create different scenarios.

A study on unit cost for diagnostic imaging tests at the outpatient department

in Chulalongkorn Hospital, 1991, used simultaneous equation model to analyze the unit cost in order to make comparison with the unit cost at break even point (Pirom and others, 1991). That study defined the break even point number of diagnostic imaging test was equivalent to the total number of fixed cost divided by the unit price minus unit variable cost. It calculated only financial costs, not economics cost. The unit cost there was found differently, namely, special diagnostic and general diagnostic images. Each unit cost depends on the amount of input used. Then made comparison one by one diagnostic image to their unit cost at break even point to know that whether the price of charge had profit or not. But here, Nakloeung district hospital did not yet charge the patient and depended on time constraints for data collection and lack of information so some estimation was done that we could not estimate the unit cost of each visit for the outpatient and each disease for inpatient department. Nakloeung study based on economics cost and estimated on the average of cost per visit for outpatient and average cost of inpatient day for hospitalization.

A manual for manager, analysis of hospital costs in 1997, Sephard provided and explained to readers as a guideline of different procedures to analyze the hospital costs within worked example for hypothetical hospital. This manual is use-full for manager of the hospital to analyze or estimate the hospital costs that can help in health care planning for next year. To calculate hospital unit cost Sephard described the approach is depends on the purpose of the analysis of hospital costs, the available data and the objective of the study. For example, if the managers want to do comparison of costs of certain hospital departments, it should compute unit costs separately. If they want to compare multiple hospitals with similar caseloads, example, all district hospitals within a particular state or region, it may be sufficient to compute a single unit cost for all inpatient care for each hospital. The ability to compute unit cost is also relied on the available data. For example, to compute unit cost by ward, it may need the minimum utilization data and the costs spent by ward. Sephard also described step down method to allocate all costs to final cost centers by several types of allocation basis. For example, administration should be allocated to others cost center by number of personnel or direct cost, maintenance should be allocated by floor area or direct costs or number of personnel.

2.3 Approach to Calculate Annual Capital Cost

To charge the patient as well as hospital costing the approach to calculate annual capital cost is important because capital asset can last more than one year. It is also important to analyze the cost-effectiveness of intervention such as cost-effectiveness of Malaria Control Program, Dengue Haemorrhagic Fever Control Program, AIDS Control Program etc. This approach is varied and different from one study to one study depends on the insight of the authors.

Sephard used the formula to calculate annual capital cost in a study of hospital cost analysis (1997) as annual capital cost in study year is equal to replacement cost in study year divided by annualization factor. The annualization factor is defined based on the real interest rate and the total life of the asset. The real interest rate is equal to $\{(1+\text{nominal interest rate}/1+\text{annual inflation})-1\}$. For example, one microscope was \$1000 with 10 years of life, 9% of inflation rate and 10% of interest rate.

Present values is \$1,090

Real interest rate = $(1.1/1.09)-1=0.0091=0.91\%$

Annualization factor of the 10 year life and 9% of real interest rate is 9.40.

Annual capital cost=\$1,090/6.418=\$115.95

A study of a methodology of health care costs and their recovery, Carrin and Elvo showed the formula to calculate annual capital cost as:

$$P_n=C_0(1+i)^n/n$$

$$P_{n-1}=C_0(1+i)^n/n(1+r)$$

$$P_{n-2}=C_0(1+i)^n/n(1+r)^2$$

...

$$P_2= C_0(1+i)^n/ n(1+r)^{n-2}$$

$$P_1= C_0(1+i)^n/ n(1+r)^{n-1}$$

i =inflation, r =interest rate, n = life of asset

They assumed that inflation rate equals interest rate and both of them stable till the n year of asset. For example, one microscope was \$1000 with 10 years of life,

9% of inflation rate and 9% of interest rate.

$$P_1 = 1000(1+0.09)^{10} / 10(1+0.09)^9 = \$109$$

However, if inflation rate and interest rate are different the annual capital cost of that microscope will be lower or higher. For example if the inflation rate 9% and interest rate 10% the price of that microscope will be \$100.40. On the contrary if the inflation 10% and interest rate 9% the price of that microscope will be \$119.42.