

CHAPTER 2

LITERATURE REVIEW

The definition of catastrophic illness could not be declared exactly, thus there are uncertainties concerning with both financing and reimbursement for insured persons. Severe heart disease constitutes one of group of catastrophic illness by a common treatment. Open-heart surgery is an alternative of treatment for severe heart disease with a highly technical, complicated procedure, and especially very expensive. Non patient is able to work independently after discharge, so they have to lose their income for quite a long period of time and absolutely affects to their economic status. Not only the high expenditure for treatment is expressed, but also the effectiveness of open-heart surgery is another aspect compared with its costs.

Amrita Institute of Medical Sciences and Research Center (AIMS) studied Open Heart Surgery for children Fund. The major cost of these surgeries is the disposable items required. A mitral valve item for a single open-heart surgery is \$1350 US. These surgeries are heavily subsidized at AIMS resulting in a cost to the patient that is much lower than in most other hospitals. In spite of this, many parents are still not able to afford the operation. The total cost to the open-heart surgery including the procedure and the hospital stay is \$2500 US (<http://www.aimshospital.org>).

In 2000, J.B. O'Connell studied about the economic burden of heart failure and found that heart failure, a major cause of morbidity and mortality among the elderly, is a serious public health problem. As the population ages and the prevalence of heart failure increased, expenditures related to the care of these patients will climb dramatically. As a result, the health care industry must develop strategies to contain this staggering economic burden.

Mortality rates from congenital heart failure continue to be high, with a 6-year mortality rate secondary to heart failure of 84% in men and 77% in women. (Croft JB et al) In 1996, heart failure caused 43,837 deaths; women accounted for a larger proportion 62% than men 38%. (American Heart Association, 1999)

Dr. Lewis Kuller reviewed 326 medical records that had received medical examination within the six-month period before they died of a sudden heart attack. 86 of 326 examinations were performed within the seven-day period prior to death from heart attack. Cardiovascular disease (CVD) costs the nation \$274 billion each year, including health expenditures and lost productivity. The 1999 cost is estimated to be \$286.5 billion, and the burden continues growing varied by the population ages.

As above results, we found that a lot of people were died because of heart failure. Therefore, the productivity loss had occurred in a large amount over the world.

As heart disease is catastrophic illness so it is wondering that whether it is worthwhile to spend a lot of money for its treatment, open-heart surgery to severe illness therefore is another one aspect to be considered which is the effectiveness of open-heart surgery in heart disease.

2.1 Catastrophic illness

Catastrophic illness (CI) is illness that has very high expenditure for treatment by the patients and their families because it is a big burden for the household to be responsible for (Khongsil, 1997). They often have to sell producing factors such as land and cows or they have to take a loan from external sources, especially it seeking treatment at private hospitals. After being admitted to private hospitals for some time, normally, the patients cannot pay for the health services at the government hospitals, there would be a big burden to the government which would then incur most of the costs for the operations, so it has to get compensation from other resources for example; from the Civil Servant Medical scheme or general hospital revenue. The main problems of the

high expenditure for the catastrophic illness are: the patients who cannot pay for the full charges, and have no low income scheme, the loan from the social network of the patients, and sell their assets and producing factors leading decreased the financial resource of households.

Catastrophic Illness is a major hazard, because it causes productivity loss to the patient. Examples of catastrophic illness are Trauma, spinal cord injury, cancer, aplastic mental problems and senility. If one of these illnesses occurred to anyone or any family, there will absolutely affect their financial status.

Catastrophic Insurance should be considered in relation to cost effectiveness. Besides the present treatment in Thailand now that can lead to long term recovery with a high quality of life, the treatment and the financial implications can usefully be compared with, for example, the treatment of acute pediatric leukemia and breasts cancer or coronary bypass surgery. It seems that the type of treatment and the difficulties of treatment affect the goals of the investment, as to whether there would be any good result for life and health. As for the very high expenditure in treatment, for example, liver cancer or spleen cancer have a low effectiveness of treatment, but a similar high cost. (Khongsil, 1997)

Many countries have established the relevant health insurance schemes. For example, in the Netherlands, the government established the National Health Insurance for Catastrophic Risks (AWBZ) to regulate everyone who has income in order to cover the premium to the health expenditure fund for people in case of :

- A) Chronic illnesses, which require treatment more than 1 year.
- B) Mental or physical handicapped that they have to be admitted to hospitals.
- C) Geriatric nursing care

In Singapore, the government has established the Medishield fund by deducting from the Medisave fund of everyone who has income except those who does not want to join this scheme. Medishield will be responsible for 80% of the excess expenditure that

they cannot afford. (excess 20% of annual income). These two examples can illustrate the different definitions of catastrophic illness and indicate the different ways to manage this class of illness in each country.

Health Service System and Catastrophic Illness in Thailand (Khongsil, 1997)

The most important point in suggestions for the health service system and catastrophic illness in Thailand is "accessibility" or a chance for anyone to get health care service, especially the poor people. There are lots of difficulties to enter the health care service from the government sector:

- A) Occupancy rate: because there are lots of patients in every government hospital so some patients have to firstly consume services from the private sector even though the charges are very expensive before being referred to the government hospital. If they still have some money at this stage, they would have paid some to the government hospital until the last reserve was gone. If they have no alternative.
- B) Some consumers do not believe in health care services from the government sector so they prefer to consume services from the private sector but finally, as the limited money is consumed they would get into a catastrophic situation.

There are alternatives to cope with the above problems:

- Improving the health care services in both quantity and quality: in quantity, the hospital should be able to serve more patients and in quality, the hospital should separate the patients in each department into intensive care beds and normal care beds. For example, patients who are admitted for rehabilitation, the non-responsive patients who have to get potential nutrition, and the chronic diseased patients who do not need intensive care. This is way to decrease the number of occupied beds to make way for the acute phase patients.
- Service charge/price control in private sector so that the patients can get quality care at reasonable price.

Thai health care system is also a part of the general economic system including with government and private sectors. However, Consumers still have not enough information about the health care services, which can be classified into 3 classes as follows:

1.) Low-income people or poor people:

Health care services are taken from the government sector at health centers, district hospitals, general hospitals, and regional hospital.

2.) Middle people

This class is contributors to insured groups like the Health card scheme, Social Security scheme, Civil Servant Medical scheme, and Workmen Compensation scheme. They can choose whether to take the services from the government or the private sector.

3.) Rich people

This class may have private insurance or can afford to pay out of pocket for the high charge of the private sector. They also can choose to take services from efficient and high quality government hospitals as they have ability to pay. (Khongsil,1997)

2.2 Criteria and Rate of Reimbursement in the Ministry of Public Health (Health Insurance Office, 2000)

The Health Insurance Office has just been approved; the open-heart surgery is in the criteria of reimbursement for high health expenditure. According to the proclamation of the Health Insurance Office, the third Proclamation: Criteria and rate of reimbursement in case of open heart surgery, 2000, it stated that the Health Insurance Office would be responsible for the expenditure of open heart surgery which is equal to 100,000 bahts per case (Health Insurance Office, 2000)

2.3 Criteria and Rate of Reimbursement in Social Security Office (Payment System for Health care under The Social Insurance Scheme, 2001)

While the Social Security Office has just been approved, the open-heart surgery is in the criteria of reimbursement for high health expenditure. The hospital's expenditure increases according to number of care since the social security office has approved the heart surgery. Hence, the trend of hospitals minimizes their service in order to avoid the risk of loss. Besides the capital payment system, SSO has introduced addition payment of open-heart surgery at rate 100,000 bahts per case to the hospital. (Payment system for Health Care under The Social Insurance Scheme, 2001)

2.4 Open-heart surgery

Any performing on heart surgery by opening chest, the term "open " refers to the chest, not the heart itself (which may or may not be opened depending on the type of surgery). Open-heart surgery also includes with surgery on the heart muscle, valves, arteries, or other structures as well.

A heart lung machine (also called bypass) is usually used to help provide oxygen rich blood to brain, heart muscle, and other vital body areas. It pumps the blood, supplies oxygen to the blood, and removes carbon dioxide from the blood.

There are some new surgical procedures being performed with the heart still beating. The procedures refer to as minimally invasive heart surgery or limited access coronary artery surgery. These procedures are being evaluated in several medical centers as an alternative to the standard methods using the heart lung machine.

The procedures of open-heart surgery are as follows:

- Heart bypass surgery (Coronary Artery Bypass Graft)
- Open Valvuloplasty
- Aortic dissection or aneurysm (open heart)

- Valve replacement
- Total correction of transposition of great arteries (TGA)
- Repair atrial defect –close (ASD)
- Ventricular septal defect repair (VSD)
- Total repair of tetralogy of Fallot (TOF)
- Other complex congenital anomaly

2.4.1 Indications of open heart surgery

In 2001, William G. Wang, (2001) Department of Cardiothoracic Surgery assessed the indications for open-heart surgery and found the type and timing of surgical repair depends on the child's condition and the type and severity of heart defects.

In general symptoms that indicate that surgery is needed are:

- Blue or gray skin, lips, and nail beds (cyanosis), meaning there is not enough oxygen in the blood (hypoxia)
- Difficulty breathing because the lungs are "wet", congested, or fluid filled (congestive heart failure)
- Problems with heart rate or rhythm (arrhythmias)
- Excessive work load on heart that interferes with breathing, feeding, or sleeping

2.4.2 Convalescence

In 2000, Robert O'Rourke studied about congenital heart defect corrective surgery and found that most children need to stay in the Intensive Care Unit for 3 to 7 days and stays in the hospital for 5 to 14 days. By the time the child is transferred out of the intensive care unit, most of the tubes and wires have been removed and he is encouraged to resume many of his daily activities. At the time of discharge, the parents

are instructed on activity, how to care for the incision and how to give medications their child may need to take such as digoxin, Lasix, Aldactone and Coumadin. The child needs at least several more weeks at home to recover. (Robert O'Rourke, 2000)

2.4.3 Unit Costs for Open-heart surgery

In 1994, Congenital Heart Defect Corrective Surgery studies about the costs for open-heart surgery and found that the cost of any surgery varies significantly between surgeons, medical facilities, and regions of the country. Patients who are younger, sicker or need more extensive surgery will require more intensive and expensive treatment. Surgery charges can be separated into five parts: 1) the surgeon's fee, 2) the anesthesiologist 's fee, 3) the hospital charges which includes nursing care and the operating room, 4) the medications, and 5) additional charge

1. Surgeon's fee: averages \$2,000 to \$5,000
2. Anesthesiologist 's fee: average \$350 to \$400 per hour
3. Hospital charges: basic rate averages \$1,500 to \$1,800 per day (more for the intensive unit (ICU) or private rooms)
4. Medication charges: \$200 to \$400 more
5. Addition charges: assisting surgeon, treatment of complications, diagnostic procedures (such as blood or X ray exams), medical supplies, or equipment use.

Insurance coverage for surgery expenses depends on many factors and should be explored for each individual instance. (Congenital Heart Defect Corrective, 1994)

Amrita Institute of Medical Sciences and Research Center (AIMS), study about the cost for open-heart surgery (ASD) and found that the total cost for the Atrial Septal Defects (ASD) device, procedure costs, and the required three day hospital stay is \$3000 US.

In 2001, Jaiyoudsrind, S. et al studied about costs for open-heart surgery at Ratchawithi Hospital, Thailand and found that the average total cost in Ordinary open heart surgery accounted for 82,578.19 bahts, it was 95,389.82 bahts in Coronary Artery Bypass Graft, and it was 169,592.83 bahts in Complex Congenital operation. These costs were estimated from the charge price only, not in term of real economics cost. (Jaiyoudsrind, S. et al, 2001)

From studies above, there are lots of differences between costs of Open-heart surgery, which depend on each organization and operation method. Anyway, open-heart surgery is very high cost of treatment.

Coronary Artery Disease

Coronary artery disease is the most common underlying cause of cardiovascular disability and death. Men are affected about four times as frequently as women; before the age of 40 the ratio is eight to one. Other predisposing factors are lack of blood supply; spasms in the coronary vessels, which are caused by hypertension, diabetes, high cholesterol levels, adverse physical reactions to mental stress, and heavy cigarette smoking. The primary symptom is angina pectoris, a pain that radiates in the upper left quadrant of the body due to the lack of oxygen reaching the heart. If the buildup of plaque has progressed, and invasive or surgical procedure is often necessary, although a combination of a strict low-fat diet, stress management, and exercise has been found to reverse the disease. The most common procedure is angioplasty with a balloon catheter. The use of the balloon catheter often can be complicated by cracks or weakening of the walls of the vessels and may lead to rapid relogging of the affected coronary artery in order to bypass the atherosclerotic blockage and supply blood to the heart muscle.

Coronary Artery Disease: Risk Factors

Extensive clinical studies have identified factors that increase the risk of coronary artery disease and heart attack. Some of these risk factors, such as being male or having a family history of heart disease, cannot be changed. However, other risk factors can be changed and can greatly reduce an individual's risk of heart disease.

Coronary Artery Bypass Graft

Coronary artery bypass graft (CABG) surgery is an operation designed to detour bloods a segment of a heart in an effort restore blood flow to the heart muscle. Usually a vein leg is used for the bypass however other vessels may be used for the graft. The surgery chest pain, improve exercise capability and lengthen life.

The Surgical Procedure

- A vein graft from the leg or and artery from the chest maybe used for the bypass. On rare occasions an artery from the forearm cadaver vein graft may be used
- The operation takes approximately three to six hours depending on its complexity
- The anesthesiology team first inserts intravenous lines and lines for monitoring. The anesthesia is administered so the patient so the patient will be completely pain free during the patient.
- At the conclusion of surgery, the patient is sent to the intensive care.
- The average hospital stay is 4-6 days

2.5 Factors Relevant to Inpatient Charge of Open-heart surgery

In 1995, Srivanitchalorn,S. et al studied the factors influencing medical service delivery system. There are six major factors relevant to problems of health providers.

They are population change, change in the sickness pattern, change in hospital role, limited national resources with trend of increasing health expenditures, shortage of both physicians and specialists in rural areas. The study provides descriptive analyses of all the factors mentioned above. (Srivanitchalorn, S. et al, 1996)

In 2001, Yanggratoke, J. studied about determination of inpatient charge was resulted from the syntheses of all factors contributing to hospital administration's decision-making of hospital pricing and physician decision-making of used resource for admission. Hence, there were two exclusively dependent variables in this study. One was hospital pricing and the other was inpatient charge. Hospitals pricing influencing factors were financial burden, source of financing, criteria of third-party payment and hospital regulation. (Yanggratoke,J. 2001)

Because both hospital price of each service and quantity of used services explicitly affected total inpatient charge. According to the Hospital Maximizing Model, it was likely that a hospital administrator would set hospital price according to type of services and type hospital's guideline for charging medical services might reflect the price discrimination, decided by the hospitals' administrators.

In addition, used resource per admission could be represented quantitatively by DRGs relative weight of each patient's admission cost. DRGs relative weight was assigned by DRGs grouper, which was according to age of patient, severity of illness and intensity of treatments.

A physician as patient manager decided for used resources, length of patient stay and discharge status. A physician synthesized all previous practices, perception of characteristics to determine the used resource pre admission. Therefore he indirectly influenced the quantity of inpatient charge.

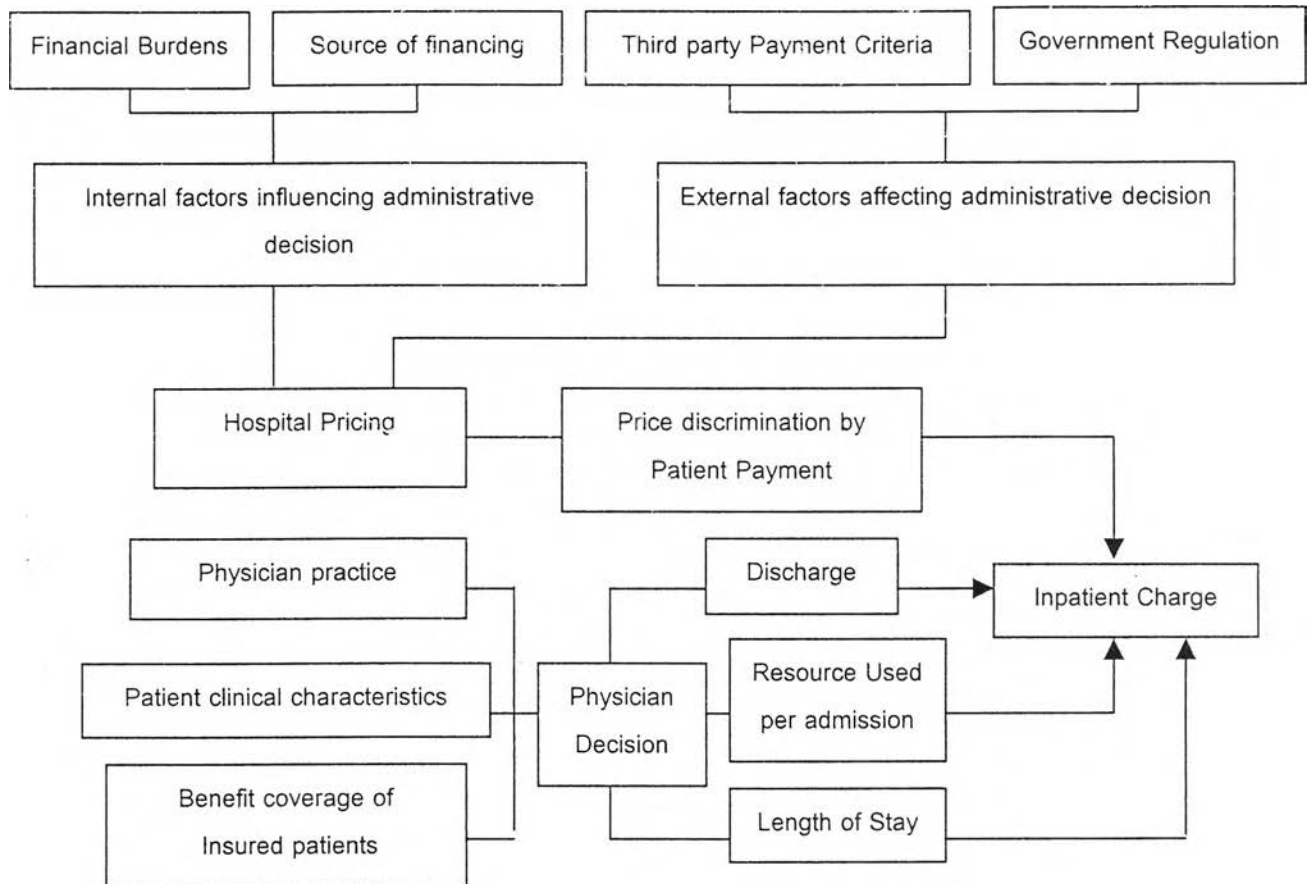


Figure 2.1: Relevant factors for Determining Hospital Charge (Yanggratoke,J., 2000)

In 1993, Hongaumpai,P. studied analysis of determine factor of budget allocation in Ministry of Public Health. In this study he used generalized least square estimation Analysis and found that the significant factor determine budget allocated in MOPH were the number of beds, length of stay, income of population. (Hongaumpai,P. 1993)

In 1996, Supachutikul, A. et al studied cost analysis of provincial hospital in Ministry of Public Health and found that the cost of provincial hospital varies significantly between length of stay, case flow, regional hospital, death rate. The variables were analysis by multiple regressions. (Supachutikul, A., 1993)

Refer to any previous research, It found that most of study concentrates on factors that effect to budget allocation; those are hospital size, number of patient admission, etc. This study concentrates on factors that effect to inpatient charge of open-heart surgery because of many operations of open-heart surgery and different expenditures, which differs from any research.

Consequently, if Inpatient charges of open-heart surgery appropriate with operation expenditure, study result should be useful for hospitals in Ministry of Public Health and Social Security Office' responsibilities to determine reimbursement rate.