



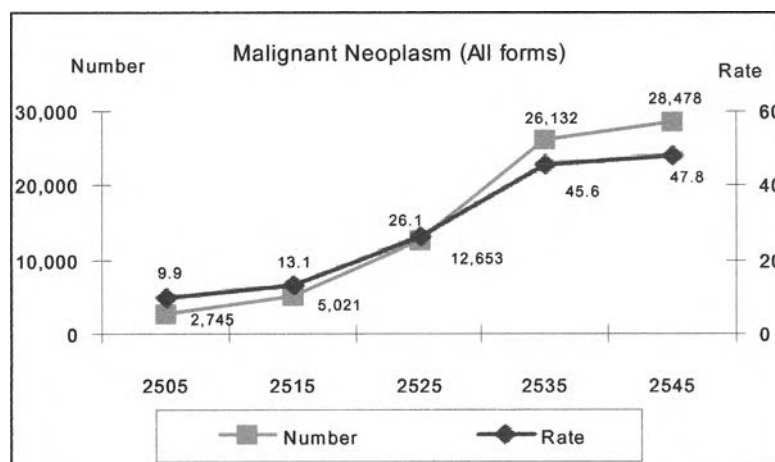
## CHAPTER 1

### INTRODUCTION

#### 1.1 Background

A malignant neoplasm among Thai populations shows an extensive increase during the past 40 years. A number of death and mortality rates from cancer caused in Thailand appeared to grow over two times every 10 years, 2,745 deaths in 1962, 5,021 deaths in 1972, 12,653 deaths in 1982, 26,132 deaths in 1992, and 28,478 deaths in 2002 (Figure 1.1). The factors affecting the neoplasm disease may have resulted from cultural, environmental, and socioeconomic changes in a life-style among Thais. Indeed, a traditional ways of living in Thai society has dramatically shifted from agricultural based economy to an industrial based behavior. People began to learn and realize more on social welfare and benefits. Working Thai people started to demand for proper treatment, wages, welfare, and working conditions, together with the Labor unions, social communities, and scholar who approached the government to enact and initiate social security scheme in Thailand.

Figure 1.1 Numbers of Death and Mortality Rate per 100,000 Populations by the Malignant Cause of Death



Source: The Ministry of Public Health, Conclusion Report, 2003

An adoption of the Labor Act passed in 1956 was the first social insurance for the contingencies of employment injury, maternity and sickness placing liabilities upon employers to provide benefits directly to their employees. Before the establishment of the Social Security Office (SSO) in 1990, the Workmen's Compensation Fund (WCF) was set up as an administrative body under the Department of Labor, Ministry of Interior in respects of employees of industrial and commercial firms. Medical cares as well as cash benefits are provided to the insured persons who have suffered from work-related accidents or diseases, together with the vocational rehabilitation available to the disabled workers.

The Social Security Act was established in September 1990 in accordance with the Social Security Act (B.E. 2533). The primary responsibility is to manage the operations of the Social Security Fund and the Workmen's Compensation Fund. Acting as a policy-making body, the tripartite (employers, employees, and government) Social Security Committee considers to release the policy aiming for effective implementation of the Social Security Act. Medical committee advises SSO specifically on medical care and services concerned. Appeal Committee decides upon appeals made against decisions of the Administration, particularly decisions on benefits payment. Similar committee exists to control the policy and the administrative of the WCF. Currently, the scheme has extended the coverage to the establishment with one employee and provided the total of 7 benefits, namely sickness benefits, maternity benefits, invalidity benefits, death benefits, pension benefits, child allowance benefits, and unemployment benefits. (Social Security Office, 2003)

The contribution rate in 2004 for 4 benefits (which provides sickness benefits, maternity benefits, invalidity benefits and death benefit) is 1.5 percent of the wages, within certain limit of wage of 15,000 baht per month. This is to note that the sickness benefits alone contribute over 0.88 percent of the total which resulting in the deficit of the budget for sickness benefits. (The co-ordination and rehabilitation division, Social Security Office,

2001) Concerning the budget deficit, the usage of money could pay more attention on the cost-effectiveness and benefits in each program that provided in sickness benefits to reduce the burden to the Social Security Fund in the future.

Social Security Office is mainly playing a social insurance operator's role by signing the contract with the registered hospitals throughout the country. Payment for health care provider of Social Security Office is divided into 2 forms: a capitation payment and a top-up payment. A capitation payment will give out an annual payment to the contracted hospital which calculated from the total of 1,100 baht per each insured person who registered and made selection of the hospital. While a top-up or a sub-payment systems will be disbursed to the contracted hospitals prior to special high cost services, payment for accident and emergency care, payment for utilization incentive, payment for diseases or items which were determined specifically, and payment for risk adjusted.

However, there are also the exclusions of health care provided to the insured persons of the Social Security Scheme, such conditions are

- 1) Psychiatric disease, except during acute illness within 15 days period of care.
- 2) Disease of injury from drug abuse.
- 3) Long-term illness which requires in-patients care exceeding 180 days per year.
- 4) Hemodialysis and Peritoneal Dialysis, except for acute renal failure which requires immediate treatment for no more than 60 days and end stage of chronic renal failure.
- 5) Aesthetic treatment which no medical indication.
- 6) Treatment on experimental study.
- 7) Treatment for infertility.
- 8) Tissue examination for organ transplantation, except for Bone Marrow Transplant.
- 9) Unnecessary examination.

- 10) Transplant surgery.
- 11) Sex interchange or transsexual surgery.
- 12) Artificial insemination in case of infertility.
- 13) Service during rehabilitation process.
- 14) Dental care, except pulling, filling, and scaling.
- 15) Spectacles and contact lens.

At the early stage of implementing a Social Security Scheme, all processes of transplant were not allowed to perform to patients under Social Security Scheme due to the criteria exclusion. Since 1996, the numbers of Leukemia patients who needed the appropriate medical condition to undergo the Bone Marrow Transplant have increased; however, the rules of exclusion were not yet covered such extra medical expenses. The cost of Bone Marrow Transplant was calculated and implemented later in 1997, and still arising question in considering the benefits, effectiveness, externalities, efficiency (both allocative efficiency and operational efficiency) and equity.

Nowadays, the Bone Marrow Transplant (BMT) become one of the four specific diseases resolutions that the Social Security Scheme allowed the sub-system payment to cover the extra-expenses to the contracted hospitals, namely Dental Care, Bone Marrow Transplant, Hemodialysis, and Artificial Lens. The criteria for utilizing a Bone Marrow Transplant in Social Security Scheme are currently classified and listed as the followings.

- 1) Chronic Myeloid Leukemia (CML) in chronic phase
- 2) Acute Non-Lymphocytic Leukemia (ANLL) in first complete remission phase
- 3) Acute Lymphocytic Leukemia (ALL) with high risk in first complete remission and Acute Lymphocytic Leukemia (ALL) with normal risk maybe allowed in secondary complete remission
- 4) Malignant Lymphoma with relapse or refractory period from first line chemotherapy or Non-Hodgkin's lymphoma (NHL)

- 5) Multiple Myeloma (MM)
- 6) Severe Aplastic Anemia (SAA)
- 7) Breast Cancer with lymph node metastasis > 10 nodes

The Bone Marrow Transplant currently costs 750,000 baht per case and not over 7,000 baht per each tissue examination. The BMT expenditures will be allowed for 3 reimbursements and not exceed 250,000 baht for each visit. A reimbursement is allowed only for 5 university hospitals where a Bone Marrow Transplant shows technologically complicated procedures and 24 hours intensive care need (see table 1.1). The patients who need to undergo the Bone Marrow Transplant with opportune medical condition criteria will have to apply to any provincial SSO offices. Then the Medical Bone Marrow Transplant Committees will examine and decide to allow the performance of Bone Marrow Transplant. Patients who are allowed and approved to undergo the Bone Marrow Transplant will be switched from their registered hospitals to one of the 5 university hospitals.

Table 1.1 The Number of Patients Classified by University Hospital

	1997	1998	1999	2000	2001	2002
Number of cases of King Chulalongkorn Memorial Hospital	4	6	4	8	8	6
Number of cases of Ramatibhodi Hospital	4	6	3	9	4	4
Number of cases of Siriraj Hospital	3	7	12	16	17	18
Number of cases of Pramongkut. Hospital	-	-	-	-	12	18
Number of cases of Songklanakarin. Hospital	-	-	-	-	-	1

Source: Social Security Office, 2003

The statistical report from Social Security Office obviously shows the increasing number of cases who want to undergo the Bone Marrow transplant in Social Security Scheme for the past 6 years (see table 1.2).

Table 1.2 The Number of Patients in Social Security Scheme with BMT Program

	1997	1998	1999	2000	2001	2002
No. of patients who register to enter to BMT program	11	24	21	38	57	70
No. of patients who passed all criteria	11	19	20	33	43	49
No. of patients who can't pass all criteria	–	5	1	5	14	21
No. of patients who die before receive BMT treatment (passed criteria)	2	3	3	2	5	1
No. of patients who get better before receive BMT treatment (passed criteria)	–	1	1*	1	–	–
No. of patients with BMT with donor	5	10	9	13	14	
No. of patients without donor (passed criteria)	4	5	7	17	24	
No. of patients who survive after BMT	3	8	4	9	5	
No. of patients who die after BMT	2	2	5	4	9	
No. of patients who survive without donor (passed criteria)	2	3	2	11	17	
No. of patients who die without donor (passed criteria)	2	2	5	6	7	

\*Treatment with interferon, Source: Social Security Office, 2003

The number of cases in hematological disease for Bone Marrow Transplant in Social Security Scheme (see table 1.3) and the annual incidence report of hematological disorder per 100,000 case in male and female also shows the increasing demand for the treatment (see in table 1.4 and 1.5).

Table 1.3 The Number of Patients Under Social Security Scheme for BMT (passed all criteria)

	1997	1998	1999	2000	2001	2002	Total
Chronic Myeloid Leukemia	6	9	9	17	16	19	76
Severe Aplastic Anemia	3	2	2	9	9	11	36
Acute Non-Lymphocytic Leukemia	1	5	7	6	11	7	37
Non-Hodgkin's Lymphoma	1	1	1	1	5	7	16
Acute Lymphocytic Leukemia	-	-	1	-	1	3	5
Multiple Myeloma	-	-	-	-	1	2	3
Total	11	19	20	33	43	47	173

Source: Social Security Office, 2003

The statistics also indicate that the incidence rate of malignant neoplasm cases among Thai male and female have not increased much when compare with the cases in Social Security Scheme. This is to believe that there may be some factors causing this incident. For instance, the SSO extended its scheme coverage to the establishment with one employee in 2002 have resulted the number of employees in Social Security Scheme to increase from about 5 million people to 7 million people in 2003. Moreover, the governmental health policy aims to run a campaign on educating employees to know their rights and benefits and the introducing of the National Health Insurance (so called 30 baht

scheme) indirectly influence people to turn to place on the Social Security Scheme for better health care benefits.

Table 1.4 Annual Incidence per 100,000 in Male, Thailand (estimated)

Site	Number		Crude rate		ASR (W)	
	1996	1999	1996	1999	1996	1999
Hodgkin's disease	103	107	0.4	0.4	0.4	0.4
Non-Hodgkin Lymphoma	1,265	1,438	4.4	4.9	4.9	5.1
Multiple Myeloma	140	89	0.5	0.3	0.6	0.3
Lymphoid Leukemia	366	393	1.3	1.3	1.5	1.6
Myeloid Leukemia	405	425	1.4	1.4	1.5	1.5
Monocytic Leukemia	0	8	0.0	0.0	0.0	0.0
Other Leukemia	11	16	0.0	0.1	0.0	0.1
Leukemia unspecified	309	329	1.1	1.1	1.1	1.2

Source: The National Cancer Institute, 2003

Table 1.5 Annual Incidence per 100,000 in Female, Thailand (estimated)

Site	Number		Crude rate		ASR(W)	
	1996	1999	1996	1999	1996	1999
Hodgkin's disease	82	59	0.3	0.2	0.3	0.2
Non-Hodgkin Lymphoma	964	1,207	3.2	3.9	3.1	3.7
Multiple Myeloma	174	201	0.6	0.6	0.6	0.6
Lymphoid Leukemia	310	347	1.0	1.1	1.3	1.4
Myeloid Leukemia	410	374	1.4	1.2	1.3	1.1
Monocytic Leukemia	0	2	0.0	0.0	0.0	0.0
Other Leukemia	3	14	0.0	0.0	0.0	0.0
Leukemia unspecified	265	224	0.9	0.7	0.9	0.7

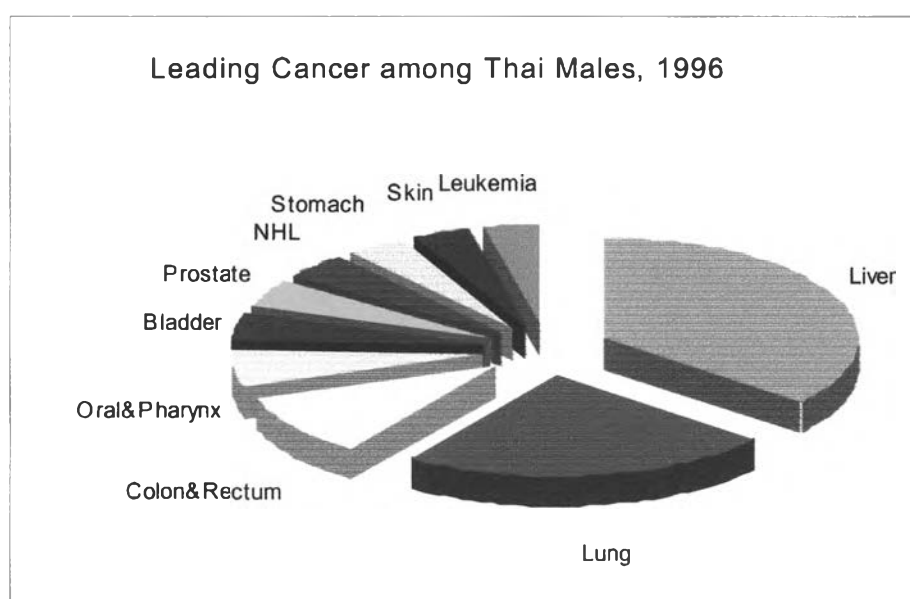
Source: The National Cancer Institute, 2003



According to the current report from the Cancer Research Foundation for National Cancer Institute, the top-ten leading cancer cases in Thailand for both male and female (see figure 1.2 and 1.3) were consisted of hematological diseases. Cancer cases among Thai males had found on Liver 40.5%, Lung 26.8%, Colon & Rectum 11.2%, Oral Cavity & Pharynx 7.1%, Bladder 5.0%, Prostate 4.9%, Non-Hodgkin's Lymphoma (NHL) 4.9%, Stomach 4.2%, Skin 4.1%, and Leukemia 4.1%. Although the Non-Hodgkin's Lymphoma and Leukemia cancer were considered and fall into the criteria for Bone Marrow Transplant in Social Security Scheme, but the decision and allowance for sub-system payment still based on case-by-case basis.

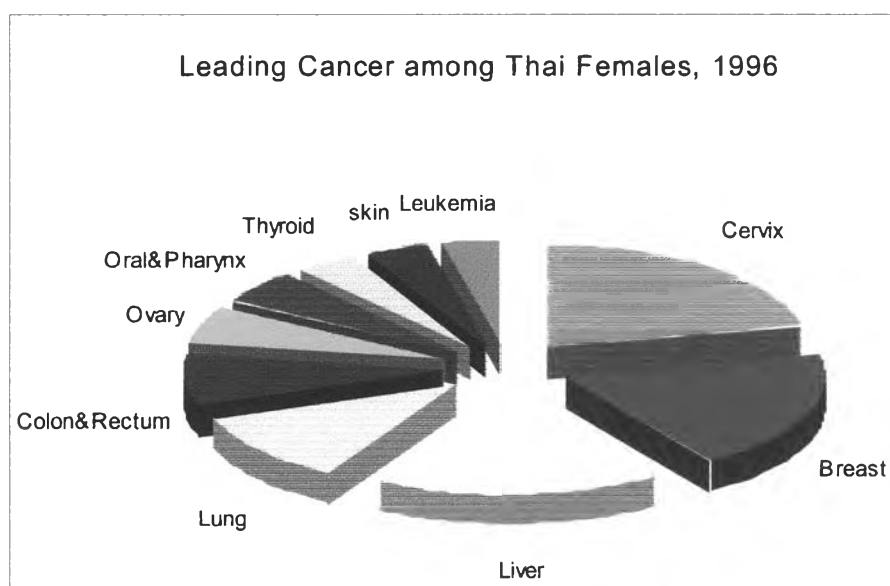
On the female side, leading cancer of female in Thailand were found in Cervix 19.5%, Breast 17.2%, Liver 16.0%, Lung 10.0%, Colon & Rectum 7.3%, Ovary 5.2%, Oral Cavity & Pharynx 4.8%, Thyroid 3.6%, Leukemia 3.5%, and Skin 3.2%.

Figure 1.2 Leading Cancer in Thailand (estimated), 1996



Source: Cancer in Thailand (Cancer research foundation for National Cancer Institute, Vol. III, 1995-2000, Bangkok, 2003).

Figure 1.3 Leading Cancer in Thailand (estimated), 1996



Source: Cancer in Thailand (Cancer research foundation for National Cancer Institute, Vol. III, 1995-2000, Bangkok, 2003).

Reports from the Social Security Office and the National Cancer Institute show the significant number of patients with hematological disorder. While the number of patients who desire to undergo the Bone Marrow Transplant has increased year by year, the resources of Social Security Fund for sickness benefits has conversely shorten, particularly the BMT and Tissue examinations charges. The program can simply cause a huge and extensive burden to the Social Security Office due to the hospitals and physicians preferring to treat patients with Bone Marrow Transplant rather than the Conventional & supportive therapy. This is to note that the Bone Marrow Transplant and Tissue examination are the additional payment that can tolerate the Social Security Office in terms of budget allocation, human resources, and organization efficiency and effectiveness.

In sum, the number of the Bone Marrow Transplant patients has been increasing tremendously year after year where the operation and procedures still expensive. The question arises whether the Bone Marrow Transplant program is an effective treatment in term of patient survival and quality of such survival or not. However, there is still a greater demand for Bone Marrow Transplant procedures than before. Though the programs require extensive and expensive coordination of variety of medical care services, but the specialized professional training and health care personal are very much necessary. The number of Bone Marrow Transplant cases alone may not be capable to show the milestone of performing Bone Marrow Transplant program. This is why the benefits impact on well being as the consequences of the Bone Marrow Transplant program is in need. Thus, the economic evaluation of the Bone Marrow Transplant program is considerably significant for the fundamental of accomplishing the Cost-Effectiveness of the program.

In the view of medical decision making, the Cost-Effectiveness Analysis is not regularly applied in the healthcare system. Most decision makers take up new treatments without knowing whether it is cost - effective. Even when some Cost-Effectiveness studies have been found, the decision makers may not be able to interpret the data or not agree with result. The principle underlying cost-effectiveness analysis is grounded on the limitation of money to substitute a possible treatment. Cost-Effectiveness Analysis is a tool to help a policy maker which medical care should be offer and as a method of comparing the cost and effectiveness of two or more alternatives. Such comparisons are useful when a conventional therapy is considered as a standard care and withstand the decision maker to be certain that the Bone Marrow Transplant is more appropriate than the status quo. This is why the Cost-Effectiveness Analysis should be the main focal point to help policy maker to evaluate situation before launching any new strategy to the public.

## 1.2 Rationale

The evaluation of the Cost-Effectiveness of the Bone Marrow Transplant program in Thailand can be generally determined in three major perspectives: the perspective of Social Security Office (as a payer side), the perspective of 5 university hospitals (as a provider side) and the perspective of the patient side. The methods of payment between Bone Marrow Transplant and Conventional Therapy in Social Security Scheme are different. The Bone Marrow Transplant is an additional payment or reimbursement while the Conventional Therapy is a capitation 30,000 baht per year for every cancer which given the Chemotherapy and fee for service in treatment with Interferon. However, the some physician and hospitals tend to provide the Bone Marrow Transplant to the patients in order to reduce the costs of their own.

The Social Security Office reported that the Bone Marrow Transplant operation requires a larger expense, but cover only small number of patients (Social Security Office annually report, 2001). Dental care reimbursement shows the number of case utilization of 700,000 to 800,000 cases per year for the Whole Kingdom while the hemodialysis (in case of end stage chronic renal failure) costs about 1,200,000 to 1,500,000 baht per year.

Seeing that all the programs mentioned earlier is diversified and varied due to different condition and treatment. The Social Security Office has become a focal point for most patients and encouraged to play a significant role of balancing and organizing proper benefits for the entire scheme. This study will attempt to acquire the Cost-Effectiveness Analysis of Bone Marrow Transplant and demonstrate the result of the analysis in order to resolve any other transplant and operation into the scheme. On the contrary, if the Conventional Therapy provides a better result, the Social Security Office should pay more attention on inducing the demand of Conventional Therapy that provides the better outcomes.

### 1.3 Research Questions

In this study, the questions arise from the previous baseline data to answering

- 1) What are the costs in perspective of payer, provider and patient?
- 2) What is the effective?
- 3) What is the effectiveness in term of life saved, number of year of life saved or extended year of life saved and quality adjusted life year saved?
- 4) What is the Cost-Effectiveness in term of cost per life saved, cost per extended year of life saved and cost per quality adjusted life year saved of Bone Marrow Transplant under Social Security Scheme, Thailand?
- 5) What is the Incremental Cost-Effectiveness Ratio of implementation under Social Security Scheme, Thailand, in term of cost per life saved, cost per extended year of life saved and cost per quality adjusted life year saved?

### 1.4 Objectives

To calculate the cost and measure the effectiveness in term of life saved, year of life saved and quality adjusted life year saved. Results compared between Bone Marrow Transplant and Conventional Therapy by using the Cost-Effectiveness Analysis. Finally, the results will be employed to evaluate the Bone Marrow Transplant program in each perspective and provided to improve to policy implementation.

### 1.5 Scope of the Study

This study wants to evaluate the Bone Marrow Transplant program under Social Security Scheme, to assign who will have the Bone Marrow Transplant or not, can not done by using random method to be an experimental group. That is not appropriate and allowed with moral and ethical concern. This study use a HLA-Identical related donor as a

criteria to randomize to experimental group and control group. The control group is patients who did not received the Bone Marrow Transplant so they received the Conventional Therapy which means Chemotherapy, Interferon and Spontaneous resolution.

Therefore, patients under Social Security Scheme who fulfill the criteria for Bone Marrow Transplant will be divided into 2 groups. The first group is the patients who already have matched the HLA-Identical in related donors are considered as a Bone Marrow Transplant. The second group is the patients who do not received Bone Marrow Transplant and have not matched the HLA-Identical in related donors are considered as a Conventional Therapy.

#### 1.6 Conceptual Framework

The study has mainly focused on the statistical data collection from Social Security Office during 1997 to 2001 and other Health Care Agencies about the diseases which performed Bone Marrow Transplant for a treatment, number of cases who supposed to do the Bone Marrow Transplant with HLA-Identical and without HLA-Identical related donor and mortality rate data. The study is divided into 3 stages.

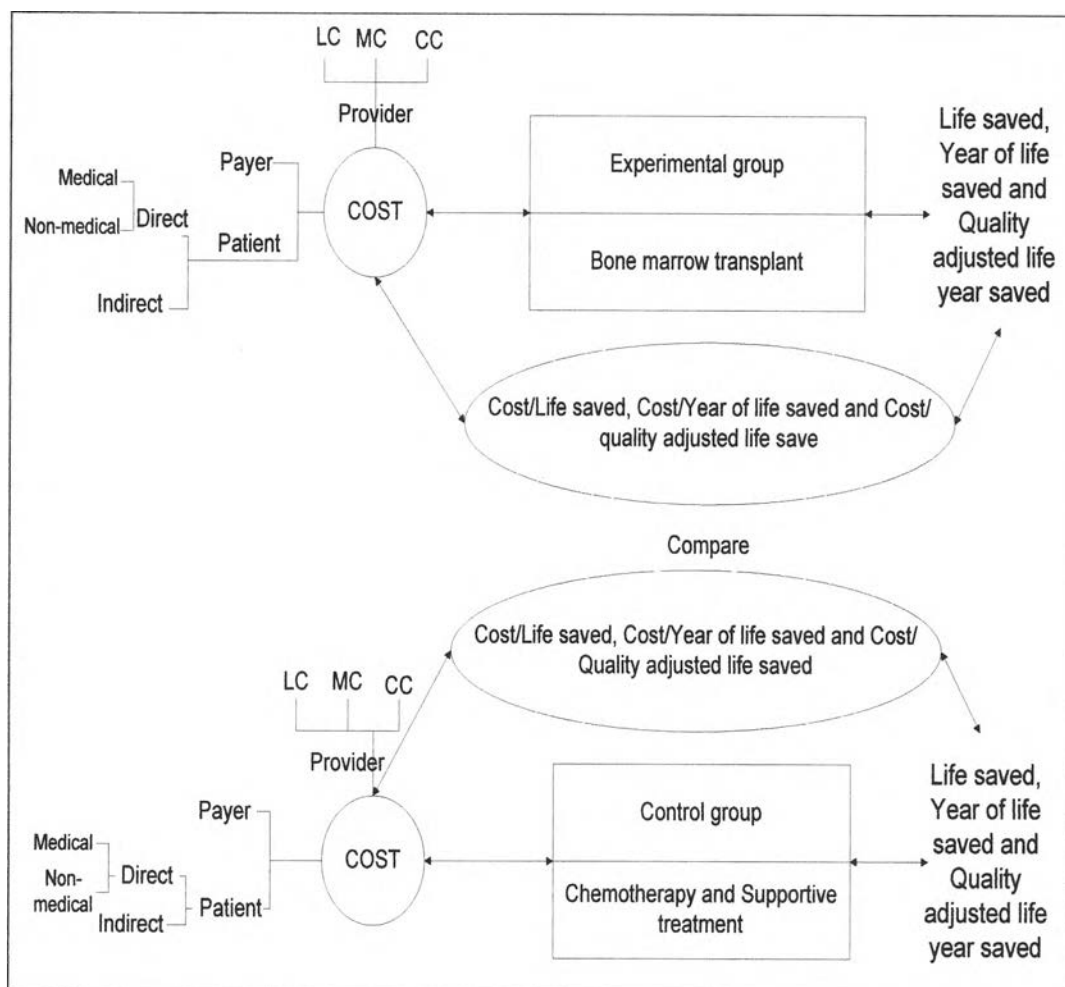
First is a data analysis on the patients who pass all criteria. The patients with HLA-Identical related donors and get treatment by Bone Marrow Transplant and the patients who did not have the HLA-Identical related donors or did not receive the Bone Marrow Transplant are the equivalent patients who received treatment with Conventional Therapy which consisted of Chemotherapy, Interferon and Spontaneous Remission.

Second, result comparison between patients who undergone the Bone Marrow Transplant and patients who treated by Conventional Therapy in term of life saved, year of life saved and quality adjusted life year saved. The result will be expected to show and

illustrate the effectiveness of the study. Methodology of the Cost-Effectiveness is to measure the Bone Marrow Transplant and Conventional Therapy, and analyzing the Cost-Effectiveness Ratio comparison of the Bone Marrow Transplant and Conventional Therapy in term of cost per life saved, cost per year of life saved and cost per quality adjusted life year saved.

Finally, the results from the analysis will be employed to evaluate the Bone Marrow Transplant program (in perspective of payer, provider and patients) by comparing with the Conventional Therapy (in term of cost per life saved, cost per year of life saved and cost per quality adjusted life year saved). The findings information would be provided to the policy makers to improve the implementation of the Bone Marrow Transplant program in Social Security Scheme.

Figure 1.4 Conceptual Framework



### 1.6.1 Cost Classification

Type of cost classification among the total of 103 patients (sample size) under Social Security Scheme is divided in different perspectives during 1997-2001.

- Provider side: principle costs have been reviewed, the retrospective determination of direct provider cost for Bone Marrow Transplant and Conventional Therapy will be used



from individual medical record from King Chulalongkorn Memorial Hospital. Cost of individual treatment of each patient due to volume and unit cost will be calculated, including labor and material cost.

- Payer side: collecting data from Social Security Office in term of money that have been paid to contracted hospitals (5 university hospital), for Tissue examination, Bone Marrow Transplant and Conventional Therapy.
- Patients side: interviewing the patients and members of their families to calculate direct and indirect cost.

#### 1.6.2 Effectiveness Classification

Effectiveness classification consists of life saved, year of life saved and quality adjusted life year saved. In addition, measuring the comparison of the Bone Marrow Transplant with the Conventional Therapy is manifold and incompatible. The number of life saved of the patients between 2 programs shows little reflection on the outcome in the long time period, while life saved can show only a number of survivors. Year of life saved will simply illustrate the contradictions between Bone Marrow Transplant and Conventional Therapy, such as number of year of life saved when introducing a new health care benefit. Even though the two indicators can indicate the number of survival analysis, but they can not reflect how the patients live after receiving any other treatment. This is to say that the quality adjusted life year saved may answer this question.

- Number of life saved: analysis data that contracted hospitals report to Social Security Office for reimbursement and patients who fail to receive the Bone Marrow transplant. Calculated the number of life saved from survival rate with survival analysis.

- Number of year of life saved: calculate from the baseline data about life expectancy in Thailand population with survival analysis of Bone Marrow Transplant and Conventional Therapy under Social Security Office.
- Quality adjusted life year saved: calculate from previous study and literature reviews in which method can reflect the real situation in Bone Marrow Transplant and Conventional Therapy.

### 1.7 Possible Benefits

The patients who undergone the Bone Marrow Transplant will show some sign of improvement more than the patients who received the Conventional Therapy. So Bone Marrow Transplant's patients will be expected to gain ability to return to work and improve the quality of life. This will help to reduce the burden to them, Social Security Scheme and Society.

The Cost-Effectiveness Analysis of Bone Marrow Transplant can be the baseline data that will benefit the policy maker upon the decision to extend any additional benefits under Social Security Scheme. Comparison analysis between Bone Marrow Transplant in terms of cost per life saved, cost per year of life saved, and cost per quality adjusted life year saved among the programs may result in reducing the burden of the Social Security Office. The Cost-Effectiveness Analysis can also assist the Social security Office to prepare and estimate for the cost and benefits in each program prior to the real situation of health care service in the Social Security Scheme.

Nowadays, the Allogeneic Bone Marrow Transplant, with related donors or without related donors, can provide merely equal result of outcome. If the Bone Marrow transplant contributes the better result but without HLA-identical donor, the government should be raise more campaign for the donation to increase the possibility of HLA-matching. For

example, a person of European ancestry has been estimated a registry of 200,000 potential donors. European ancestry would provide a 40-50% chance of containing an HLA-matched donor. The government should develop and enlarge public facility to search for unrelated donors in the Asian region due to the imprecision of traditional serologic studies and the HLA-typing at molecular level has been widely adopted as a technique for identifying HLA-matched unrelated donors.

### 1.8 Limitations of the Study

Being a retrospective study, there are numbers of limitation that may reduce the significance of this study. Firstly, the unit cost is available only for King Chulalongkorn Hospital, but not in all 5 university hospitals. As a result, this study has to assume that every university hospital would share the same unit cost of each treatment, both the Bone Marrow Transplant and Conventional Therapy, where King Chulalongkorn Hospital's cases are apparently covered over one third of the whole total cases in Bone Marrow Transplant. But this DRG may be underestimated from not including the cost of donor harvesting and it is the DRG per case per admission, if patients who admitted with several times in different condition maybe not included the whole cost of treatment in hematological diseases in Bone Marrow Transplant under Social Security Scheme.

Second, the results of Bone Marrow transplant during 1997 to 2001 under Social Security Scheme reveal inadequate time-series data for evaluating a 5 years survival. The basic calculation employing in this study needs longer time-series data in order to strengthen effective results and further analysis.

Third, the cost of Bone Marrow transplant in perspective of the Social Security Office may not reflect the actual cost in economic aspect. It may reveal the price for additional payment under the Social Security Scheme only, which similar to the payment calculation in perspective of provider upon the Bone Marrow Transplant for each university hospitals.

Finally, the way that Social Security Office pays for the Bone Marrow Transplant as an additional payment for reimbursement and capitation for Conventional Therapy is different and causing some bias in the scheme.