



CHAPTER 5

DISCUSSION, IMPLICATION, AND CONCLUSIONS

This chapter attempts to draw together discussion on the results from previous chapters. The policy implications will be attempted in the term of various practical and policy recommendations as well as proposals for further study.

5.1 Discussion

Bone Marrow Transplantation is a cost averse catastrophic operation considering Thailand as a developing country with uneconomical cost and insufficient budget for health care benefits maneuver. Social Security Office has been collecting a 1.5% of contribution for illness case to cover entire categories diseases. The payment is mainly allowed in capitation system in order to avoid the unpredictable burden to the Social Security Fund. In addition, the burden tends to place more on the provider side due to the severe illness patients who changed the registered hospital to the specialty hospitals, such as tertiary hospital, center hospital, or university hospital. As a result, these hospitals will be affected and experienced the risk or adverse selection from the high risk group of patients.

The Social Security Office has introduced an additional payment to solve the problem for tertiary hospitals, especially in particular diseases with high cost care such as Cancer, HIV, Hypertension, CVA, Cirrhosis, Diabetes, and CHD. The Bone Marrow Transplant appears in additional payment categories, but the cost to the Social Security Office and the burden to Social Security Office to manage the health care benefits is still expensive. The study also provides the basic data for policy makers to support the improvement in the implementation of Bone Marrow Transplant comparing with the

Conventional Therapy. The reason is just to show the focal points in the recommendation and reveal a basis of Cost-Effectiveness Analysis of Bone Marrow Transplant in Thailand.

The discussion of the study can be exposed in several aspects as the followings.

1. General Population

The proportion between male and female in the study is 1: 1.19. The proportion also shows a similarity with the proportion of general population in Thailand. This is to conclude that gender has no effect on the number of entering of Bone Marrow Transplant and Conventional Therapy.

The average age of population is 30.96 where mode is 27, and median is 30. The most proportion of age is ranged 25-29 and 83.49% of patients aged between 20-39 is concerned as a major problem. The reason is that the patients aged 20-39 still in the active labor force, and their sickness may affect the entire workforce and labor participation rate of the country. Moreover, younger patients give the better result in Bone Marrow Transplant because of their youthful can easier tolerate an aggressive treatment than the elderly patients. From the age factor alone, the result of Bone Marrow Transplant and Conventional Therapy under Social Security Scheme, Thailand will be able to generate a better outcome.

The HLA-identical related donor indicates 50.5% result in Bone Marrow Transplant under Social Security Scheme in Thailand during 1997 to 2001. This result concludes an exaggerated change of HLA-identical related donor matched in comparison with other studies in Thailand and worldwide (Nathalang et. al, 2002 and Harrison's Principal Internal Medicine). In remarks, the result rate in Thailand is about 34.7% while the result rate in the US is only about 30% in sibling matched.

Investigating in more detail annually during 1997 to 1999, the HLA-identical related donor matched claims some highly average percentage of 66.1% may be derived from the factor affecting this result such as the knowledge of the Bone Marrow Transplant benefit under Social Security Scheme. Knowing that any transplantation is not allowed to be performed under this scheme, the patients who suffer sickness with hematological disease and receive the treatment, both general physicians with registered hospitals excepting 5 university hospitals and patient, may have no knowledge about the Bone Marrow Transplant allowance in the scheme. When the patient is admitted to the HLA-identical related matched and wish to undergo the Bone Marrow Transplant which available in only few specialty hospitals (mostly are the hospital in Bone Marrow Transplant program under Social Security Scheme), the hematologist will introduce the patient into the Bone Marrow Transplant program. And this maybe the results of highly HLA-identical related donor matched derived from.

In 2000 and 2001, the rate of HLA-identical related donor matched was about 40.6%, this rate is very similar to the previous results of HLA-compatible related donor. The reason maybe that the Bone Marrow Transplant is known both in all contracted hospitals and general employees under Social Security Scheme

There are 4 university hospitals under the Social Security Scheme during 1997 to 2001, namely King Pramongkut Hospital, Ramathibodi Hospital, King Chulalongkorn Memorial Hospital and Siriraj Hospital. Among them, Siriraj Hospital has played a major role of performing the Bone Marrow Transplant of around 47.6% under Social Security Scheme, while other hospitals show lower contribution on the number of patients. The number of patients in each hospital will generally rely on the number of bed/room available. This is to note that those patients who would have low immunity after transplant due to extremely hygienic to prevent the opportunistic infection.

The study employed the unit cost of Bone Marrow Transplant and Conventional Therapy that calculated from King Chulalongkorn Memorial Hospital due to this hospital had the second highest number of patients under Bone Marrow Transplant in Social Security Scheme, although the King Chulalongkorn Memorial Hospital had only 2 bed available.

The major disease in this study is CML, it contains over a half of total diseases of Bone Marrow Transplant and Conventional Therapy under Social Security Scheme in Thailand. The ANLL represents the second dominantly disease and SAA represents the third place. All Leukemia categories in this study contain 77.7% while the Aplastic Anemias group is 17.5%. The criteria for theses diseases of Bone Marrow Transplant under Social Security Scheme is allowed upon decisive strict procedure, the conditions of theses diseases are given the poor prognosis result without treatment.

2. Cost

From the sensitivity analysis upon different discount rate of cost, there is not much different between Bone Marrow Transplant program and Conventional Therapy for example: provider cost in 1997 with 3% of discount rate is 2.73 million baht and with CPI discount rate is 2.686 million baht. Furthermore, the different between payer cost and provider cost or total cost (provider and patient cost) appear to reveal the same results with the different discount rate: 3% for 3 perspective, CPI for 3 perspective and MLR for provider, CPI for patient and IR for payer. The total cost is less than the payer cost about 2 millions baht in combination cost of both Bone Marrow Transplant and Conventional Therapy. In addition, this study employed the 3% of discount rate in 3 perspective and in the effectiveness discount rate also.

- Provider

The cost for provider perspective was calculated from PS and medical services at King Chulalongkorn Memorial Hospital. The calculation only employed from the patient's medical record, not included the harvest of donor cost. Thus, the number from calculation may result in under-estimated. This study also adopted the DRG per case at King Chulalongkorn Memorial Hospital to the estimation for the other hospitals of Bone Marrow Transplant under Social Security Scheme. The study assumed that the costs of university hospitals will be the same as the King Chulalongkorn Memorial Hospital as a result of these hospitals are tertiary care hospital and university hospital as well as being a public hospital.

As the based year is 2001 with different of discount rate that calculated from CPI, the cost of provider has increased from about 2 millions baht to 7.7 millions baht during 1997 to 2001 and number of patients has increased from 5 patients to 13 patients per year. The total costs of two programs under Social Security Scheme are much different. The cost of Bone Marrow Transplant is 4 times higher than the cost of Conventional Therapy considering both treatments are performed to the same group of patients with the same group of diseases and conditions.

Even though the cost of Bone Marrow Transplant is high, but the payment from Social Security Office is even much higher. Among Conventional Therapy group, the provider experiences the budget deficiency while the provider makes some profits among the group of Bone Marrow Transplant. To increase the profits, the scheme will need to acquire more patients and enlarge availability of bed in specialty ward.

- Patient

The cost of patient in Bone Marrow Transplant and Conventional Therapy composes of two major types, the direct non-medical cost and indirect cost during 1997 to 2000, and present value with different of discount rate based year 2001.

In Bone Marrow Transplant group, the direct non-medical cost contains 25% of the total cost while the indirect cost contains another 75% of the total cost. The indirect cost is mostly derived from donor expense and care takers. In Conventional Therapy group, the direct non-medical and the indirect cost share a similar proportional cost as a result of the indirect cost in the Conventional Therapy is mostly relied on the care takers.

After converting cost to the present value, the total cost of Bone Marrow Transplant program indicates much higher result than the cost of Conventional Therapy. The Conventional Therapy costs about 25% of the total of two programs while the Bone Marrow Transplant costs almost 75% of the total cost of two programs.

The cost of Conventional Therapy increased tremendously during 2000 – 2001. This can be explained as the aftermath of the number of patients increased from 6 to 19. In addition, the cost of Bone Marrow Transplant in 1999 was higher than in 1998 while 1998 had 11 patients and 1999 had 10 patients. Furthermore in 1999, one patient acquired donor from the brother who lived in USA so the travel expenses and wages in the indirect cost were much higher. This incident occurred in 2001 again, though the donors were not come from USA alone, but from several countries. In sum, the highest indirect costs still come from the donor from USA.

- Payer

Cost of the payer based year 2001 with different of discount rate, the payment of the Bone Marrow Transplant in 1997 and a half year of 1998 was paid 600,000 baht per case, 3 times each. By that time, HLA-matched for Tissue Examination was not paid in the second half of the year until now Tissue Examination was allowed for payment not exceed 7,000 baht each time. Bone Marrow Transplant was paid 750,000 baht per case, 3 times each.

Cost of Conventional Therapy was paid in capitate's categories for cancer, not over 30,000 baht per case per year, but Interferon was paid in fee for services not over 750,000 baht per case. In this study, cost of Interferon is around 400,000 baht per case.

Compared cost between two programs, the cost of Conventional Therapy was only 5% from total cost of two programs. In the payer perspective, total payment for the group of diseases in Bone Marrow Transplant and Conventional Therapy, payer pays higher cost than occurred in the provider side. Payers paid less than the cost in Conventional Therapy and paid more the cost in Bone Marrow Transplant. In the future, if the patients under Social Security Office with Interferon make Social Security Office pays more on the Interferon, the cost of Conventional Therapy will increase as well as the cost of Bone Marrow Transplant.

3. Effectiveness

- Number of Life saved

The status of patients in Bone Marrow Transplant and Conventional Therapy was divided into 4 categories: Alive, Alive with m39, Alive with R and Dead

1. Alive refers to patients in Bone Marrow Transplant and Conventional Therapy groups that still alive after receiving the treatment and are in the Social Security System. Patients have been employed and paid in the part of employee to Social Security Office, employer continue to pay the part of employer to Social Security Office and Government will pay for their contributions also.
2. Alive with m39 refers to patients in Bone Marrow Transplant and Conventional Therapy groups that have been reported to be alive until the end of the data collection after receiving the treatments. Patients who retire from the employment will receive payment both parts of employee and employer to get the right of beneficiaries in Social Security Scheme. The government will still pay in the contributions for them also.

3. Alive with R refers to patients in Bone Marrow Transplant and Conventional Therapy groups that have been reported to be alive until the date that they leave out of Social Security Scheme, either disappearing or retiring from the scheme after receiving the treatment. Patients who did not pay in the part of employee themselves and employers will have to inform or report to Social Security Office for their retiring status. After retiring, these formal employees would get the return of partial pension benefits. This is also to note that the study experienced a difficulty getting information of these groups of patients due to their moving and changing addresses.
4. Dead refers to patients in Bone Marrow Transplant groups that have been reported to be dead while they are still in the Social Security Scheme, by hospital or employer or relatives. These groups may be observed upon their statements of people who received the dead and pension benefits from Social Security Office.

Comparing the status of Bone Marrow Transplant and Conventional Therapy, the status of Alive with m39 in Conventional Therapy indicates 5.9% while in Bone Marrow Transplant group shows 11.5%. The result shows patients in Bone Marrow Transplant realize and understand about the benefits from Social Security Scheme and continue to entail the system by paying for the part of employers. Moreover, patients in Conventional Therapy program with status Alive with R is 11.7% while patients in the Bone Marrow Transplant program is only 1.9%. Both results indicate patients' willingness to pay for Social Security Scheme benefits in Bone Marrow Transplant rather than the Conventional Therapy.

When dividing the result of dead and alive by disease categories, the result shows some interesting information of patients in Bone Marrow Transplant and Conventional Therapy under Social Security Scheme, Thailand. The NHL deploys the worst result both

in Bone Marrow Transplant 25% of survival rate with 4 patients and in Conventional Therapy: none of patient survived.

ALL group contains only 2 patients in Bone Marrow Transplant with 50% survival rate and no patients in the Conventional Therapy.

ANLL in Bone Marrow Transplant with 13 patients point out 46.67% of survival rate where the Conventional Therapy with 12 patients shows only 16.67% of survival rate. This group of disease shows the better result in Bone Marrow Transplant than Conventional Therapy, even though the survival rate is not as high as possible in the reference standard treatment which 40%-60% of curative rate (Appleton and Lange).

CML is apparently a major disease in Bone Marrow Transplant and Conventional Therapy under Social Security Scheme in Thailand. Bone Marrow Transplant with 29 patients claim 55.17% of survival rate, while the Conventional Therapy claims 45.83% of survival rate with 24 patients. The survival rate between the Bone Marrow Transplant and Conventional Therapy shows no different. In comparison with the result of standard text book (Appleton and Lange) which Bone Marrow Transplant presents the 40%-70% of 5-year-disease-free and Chemotherapy shows about 30%-50% of complete cytogenetic response, but in a short lived.

The best results obviously derive from SAA disease. The Bone Marrow Transplant with 5 patients covers 80% of survival rate and 46.15% of Conventional Therapy with 13 patients. In comparison with the result of standard text book (Appleton and Lange) which Bone Marrow Transplant indicates survival rate 70%-90% and Chemotherapy shows the partial response about 60% with long-term prognosis good.

Calculating roughly from the number of dead and alive status from Bone Marrow Transplant, the Bone Marrow Transplant saved 28 life and Conventional Therapy saved 22

life. When categorizing the specific diseases, the SAA in Bone Marrow Transplant appears as the most effectiveness outcome comparing with other diseases. With survival analysis, the survival rate in Bone Marrow Transplant is 0.5262 then Bone Marrow Transplant saved 27.36 lives and survival rate in Conventional Therapy is 0.3207 and could save 16.38 lives.

In conclusion, the Bone Marrow Transplant saved more lives than the Conventional Therapy in term of life saved.

- Number Year of Life saved

For number year of life saved, the Bone Marrow Transplant saved is 1,107.81 year while the Conventional Therapy saved is 662.42 year. Therefore, the Bone Marrow Transplant gives the better results than Conventional Therapy.

- Quality of Life

After receiving the treatments of Bone Marrow Transplant and Conventional Therapy for 6 months, the major problem of Bone Marrow Transplant experienced the some problem in term of anxiety of opportunistic infection which concerned as the highest problems. Patients in Conventional Therapy, on the other hand, experienced no problem after receiving the treatment. Dominant problem apparently ensured the problem categories about 31.25% with pain of bone and extremities and uncomfortable of unexplained well-being.

Program EQ-5D provided the same resulting picture of quality of life as mentioned above in term of utilities to compare between Bone Marrow Transplant and Conventional Therapy. The conventional Therapy reveals the results on quality of life that better in

period of time after received the treatment for 6 months and 1 year. In a long term quality of life from 1997 to 2001 until February 1, 2004, the result shows 3 to 7 years longer as the quality of life in Conventional therapy tends to reduce while Bone Marrow Transplant appears to increase.

The projection of utility about the changes in Conventional Therapy and Bone Marrow Transplant has done by the 6 Hematologists from the same university hospital. They suggested that the quality of life in Bone Marrow Transplant shows much better result than the Conventional therapy due to the chance of relapse or refractory period. Every 3 months Conventional Therapy group will have to follow up the blood test, patients still lived with the old bone marrow cell etc. Therefore, Bone Marrow Transplant group acquires 0.85 and Conventional Therapy acquires only 0.5 in term of utility.

Results in QALY's term, without discount rate, Bone Marrow Transplant can save 941.63 QALY's and Conventional Therapy can save 331.21 QALY's. When applying 3% discount rate, Bone Marrow Transplant can save 720.68 QALY's and Conventional Therapy can save only 253.5 QALY's

Upon receiving the treatment of Bone Marrow Treatment of Bone Marrow Transplant and Conventional Therapy for 1 year, the major problem of Bone Marrow Transplants switched from some problem into the no problem categories. Patients still obtained anxiety of getting opportunistic infection, very hygienic food and stuffs to prevent the complication of infection. Patients in Conventional Therapy showed less some problem after 1 year of treatment and 25% of them, continued receive anxiety sometime of relapse or refractory period of disease.

After receiving the treatments of Bone Marrow Transplant and Conventional Therapy for long-term followed up, both groups of patients continued to have a little

proportion of some problem. The Conventional Therapy moved to some problem group of anxiety, uncomfortable pain and usual activity than Bone Marrow Transplant.

4. Cost-Effectiveness Analysis

In terms of cost per life saved, the Bone Marrow Transplant appeared to cost much higher than the Conventional Therapy in all three perspectives. It simply takes about 1-1.3 million baht to save life in Bone Marrow Transplant, but lesser in the Conventional Therapy or about 130,000 to 400,000 baht per life saved. The highest cost in Bone Marrow transplant derived mainly from the payer side but from the provider perspective for the Conventional Therapy.

In terms of number year of life saved, the Bone Marrow Transplant tended to cost about 27,000 to 33,000 baht per extended year, while the Conventional Therapy would cost only 3,300 to 10,000 baht per extended life year. In addition, the payer and provider payment indicated the highest cost in Bone Marrow Transplant and lowest in the Conventional Therapy.

5. Incremental Cost-Effectiveness Analysis

Incremental of Bone Marrow Transplant per life saved was about 700,000 to 1,200,000 baht in order to save another one life, pending on each perspective. It still contained the highest cost of Bone Marrow Transplant in payer and Social Security Office perspective.

Incremental of Bone Marrow Transplant per number year of life saved was about 18,000 to 31,000 baht per one extended year considering each perspective.

5.2 Conclusion and Analysis

After reviewing the essential of Bone Marrow Transplant and Conventional Therapy and manipulating the calculation of both treatments in terms of cost effectiveness analysis, the study can lead to the conclusion by exhibiting in several points. The total cost per life saved is 1,168,990.29 baht where payer pays 1,348,952.15 per life saved of Bone Marrow Transplant. The payer appears to pay more than it actually cost. So the provider will receive some profits of Bone Marrow Transplant program but should be aware that the cost from the provider side may only derive from the King Chulalongkorn Memorial Hospital with under-estimated of harvested donor operation.

Total cost (provider and patient cost) per life saved in Conventional Therapy is 417,520.93 baht while cost of payer only 134,445.44 baht. The payer or Social Security Office pays less than the cost incurring from the provider side so the provider has to absorb the deficit budget due to the Conventional Therapy. That is make the provider tends to perform the Bone Marrow Transplant, but this allowance done by medical committee of Social Security Office. Patients cost less in the Conventional Therapy because the Bone Marrow Transplant including the indirect cost from donor and care taker sides.

Total cost per number year of life saved in Bone Marrow Transplant is 28,871.09 per year and 33,315.69 per year in perspective of Social Security Office. While the total cost is 10,311.7 in the Conventional Therapy and 3,320.46 per year paid by Social Security Office. Social Security Office apparently pays much more in Bone Marrow Transplant than Conventional Therapy due to the providers will bear the cost of Conventional Therapy upon themselves.

Bone Marrow Transplant appears to give the better results than Conventional Therapy in term of QALY's with 3% discount rate and general population of life

expectancy, but in the sensitivity analysis of different rate of life expectancy the results is much different.

Assuming that the patients with Bone Marrow Transplant lived longer than patients with Conventional Therapy because of survival rate in each disease and relapse or refractory period of diseases. If patient with Bone Marrow Transplant can live 30 years (40 years in Bone Marrow Transplant and 10 years in Conventional Therapy) longer than patient with Conventional Therapy, the cost per extended year of provider and patient in Conventional Therapy will grow higher than the cost per extended year of Bone Marrow Transplant, as well as the effectiveness in term of QALY's. On the other hand, payer stills pay in Conventional Therapy less or about 20,000 baht per extended year or QALY's compared with Bone Marrow Transplant.

If patient with Bone Marrow Transplant can live 20 years longer than patient with Conventional Therapy, first scenario life expectancy of Bone Marrow Transplant is about 30 year later and Conventional Therapy will live 10 year ahead. The cost of Conventional Therapy is higher than cost of Bone Marrow Transplant in perspective of provider and patient, but if Conventional Therapy lives longer about 20 years ahead while Bone Marrow Transplant lives longer 40 years, the gap between cost of Bone Marrow Transplant and Conventional Therapy will keep reducing as it may be influenced by the old age factor.

In contrast, if patient with Bone Marrow Transplant can live as longer as patient with Conventional Therapy, extended year or QALY's cost of Bone Marrow Transplant is quite expensive when compare to the cost of Conventional Therapy or about 20,000-30,000 higher per extended year or QALY's

5.3 Policy Implementation and Recommendation

The significant of this study can imply and further policy analysis in 2 directions. First, the study highlights several complications in associated with performing Cost-Effectiveness Analysis, including the efforts to deliberate and overcome the proper quality of life. One finds that Bone Marrow Transplant and Conventional Therapy comprehend substantially different costs per life saved and number year of life saved when exploiting to different diseases. The study also examines the generalizations of procedures for all patients and discovering that not always appropriate and possible. In deed, the Conventional Therapy may sustain the Bone Marrow Transplant as an existing alternative, but with limited efficiency.

In respecting the conditions of scarce resources, the decisions to allocate resources must be circumscribed cautiously since this matter is dealing with human life. The Social Security Office as a third-party intermediary should also pay more attention on the decision underlying on what kind of services to cover and to whom as well as playing the agent's role for large number of patients. In a broader view, failure in implication consideration may lead to resource scarcity and may also continue to urge health care expenditures up excessively.

Third-party payers can basically claim their reimbursement for any service that determined as a medically necessary where a judgment upon that is generally carried out to the physician responsibility. In addition, any new technology relevant could be a barrier for policy stability and consequently resulted in large-scale policy effectiveness.

From the results of Cost-Effectiveness in this study, the cost of Bone Marrow Transplant shows much different from the cost of Conventional Therapy, but the patients do not realize the burden of Bone Marrow Transplant in Social Security Scheme. Therefore, the co-payment will help to avoid the Moral Hazard in Bone Marrow Transplant program.

The study also testified the Cost-Effectiveness in Bone Marrow Transplant compared with Conventional Therapy in Social Security Scheme. The decision for selecting the best suitable program will be corresponding with the policy implementation, though there is no exact way to answer due to the value of life. In economic evaluation, amount of 36 millions baht that helped 28 lives will not consider much Cost-Effective. The amount of money can, on the other hand, provide the other categories of diseases with less cost but more effectiveness for a higher survival rate. However, the situation turns out differently in clinical evaluation or psychological evaluation, the patients or employees still demand to enter the Bone Marrow Transplant even though the probability of survival is only 0.5262 varying among each disease.

In last, introducing the Cost-Effectiveness Analysis in this study can be helpful in reviewing the problems, identifying principal challenges and collaborating with the reformulating policy criteria such as co-payment for the patient to realize the high cost care on the Bone Marrow Transplant treatment in Thailand.

The findings from the sensitivity analysis show that the providers view the cost advantage of additional 40 years life expectancy after undertaking the Bone Marrow Transplant will be discarded if the Conventional Therapy can extend a number of years of life saved from 10 to 20. The patient views that increasing 20 years in life expectancy from Conventional Therapy would reflect in losing cost advantage of the Bone Marrow Transplant while the payers see unchanged in cost advantage from the Bone Marrow Transplant. From the above three different perspective's views, the payers apparently tend to displeased and dissatisfied with the Bone Marrow Transplant because of scarcity in cost advantage. The patients tend to require the Bone Marrow Transplant due to the cost advantage, but they are expected to responsible for some fixed costs after living longer than 20 years.

In comparison with the QALY's, the cost advantage of the Bone Marrow Transplant will increase in the perspective of the providers from 10 years to 20 years where increasing from 20 years to 30 – 40 years in perspective of the patients. As a result, the short-term benefits may fall into the patients' side rather than the payers because the payers have been collecting the contribution and using the method of payment for the medical expenses on a year by year basis. Similarly, the long-term benefits return to the patients rather than the payers and this is why the Social Security Office should not suffer these huge burdens alone.

In a social aspect, if the benefits from utilizing the resources of the Bone Marrow Transplant can save and prolong patients' life, the society may agree and help in subsidizing the expenses. Thus, the younger patients may have more chance of life expectancy after undertaking the treatment and their entire living would benefit the society more than the expenses paid. As having a co-payment to responsible for some fix costs, the patients who can not afford the medical expenses may also have more chance from the society to subsidize the extra burden. In addition, the patients may also allow paying in dividend to the subsidiary donor as well as proportional payment to the payers.

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In the social aspect, if the benefits from utilizing the resources of the Bone Marrow Transplant last for long time which in the younger patient, it makes some benefits to the society therefore the society will received some benefits for live longer in the patient with Bone Marrow Transplant. The society should be consider co-payment also.

The co-payment for patient who can not afford the co-payment if some benefits in term of live longer go to society so the society should pay for them or switch the patient-provider co-payment into patient-payer co-payment instead. By let in the part of co-payment lending patient some money when they got illness and make them pay back after received the treatment.

5.4 Recommendation for the Futher Study

The use of the analysis to examine the cost-effectiveness of the Bone marrow Transplant and the Conventional Therapy contributed to understanding the components of QALY essential and its criteria. However, realizing some weaknesses, the improvements for future study are proposed in the followings.

- 1) The study of cost analysis of patients' services: The cost for diagnosis Related Group in the other university hospital or specialty hospital should be estimated in the provider perspective.
- 2) The study of cost-effectiveness analysis should be done in each disease categories, due to the various results from different stages and groups of disease, in order to evaluated what disease is considered as the most cost-effectiveness in the Bone Marrow Transplant.
- 3) The study of QALY's in the group of employee with Bone Marrow Transplant and Conventional Therapy can be helpful in evaluating the long-term quality of life. Due to the limitation in this study, this study can show only the descriptive of quality of life base on the Functional Class of medical assessment, but QALY may allow more alternatives to propose.
- 4) The studies of other cost-effectiveness analysis should be available and feasible in order to conduct more comparative study for policy decision, especially in case of highly medical care cost. Considering an economic efficiency, unequal cost-effectiveness ratios in various programs, at least at the margin, simply imply that additional lives or years of life could be enlarged upon reallocating adequate resources among programs.