COST-BENEFIT ANALYSIS OF ANTIRETROVIRAL THERAPY TO ADULT PATIENTS WITH AIDS UNDER THE UNIVERSAL HEALTH COVERAGE IN CHIANGRAI REGIONAL HOSPITAL

WANNEE CHAISIRIPENPAK

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Thesis
entitled

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ABSTRACT

The aim of this study was to analyze the cost and benefit of antiretroviral therapy (ART) to adult patients with AIDS under the Universal Health Coverage scheme in Chiangrai Regional Hospital, in fiscal year 2008. Total cost of ART was derived from both the provider and patient perspective and valued in term of internal cost and external cost. The benefit of ART was calculated in terms of willingness to pay (WTP) by contingent valuation method. The study population consisted of two groups: the first group was all providers who had been involved with ART and the second group was 200 patients with AIDS who had received ART (160 outpatient cases and 40 inpatient cases).

The results revealed that the total cost of ART was 11,366,561.18 Baht, with 8,838,069.65 Baht for internal cost and 2,528,491.53 Baht for external cost. The average cost or unit cost of outpatient (OP) ART services was 1,380.87 Baht per visit, and for inpatient ART services was 3,067.16 Baht per day. Furthermore, the average WTP of OP ART services was 426.06 Baht per visit, and the average for WTP of IP ART services was 874.50 Baht per day, so gross benefit-cost ratio of OP was 5.31 and the gross benefit-cost ratio of IP was 4.06. Therefore, ART was worth continuing on with the Universal Health Coverage. However, the vendor-supplier managed inventory and availability of laboratory was extremely important for the ART, both at hospital and national level, especially for the dispensing of antiretroviral drugs according to actual taking, and allowing enough medication for the follow-up dates, as well as providing preventive intervention against using non-efficacious antiretroviral drugs, and preventing the increase of drug resistance before access to ART.

KEY WORDS: COST / BENEFIT / ANTIRETROVIRAL / WILLINGNESS TO PAY

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การวิเคราะห์ต้นทุน-ผลได้ของการให้ยาต้านไวรัสเอดส์ ในการรักษาผู้ป่วยเอดส์ผู้ใหญ่ ภายใต้ระบบหลักประกันสุขภาพถ้วนหน้า ในโรงพยาบาลเชียงรายประชานุเคราะห์

COST-BENEFIT ANALYSIS OF ANTIRETROVIRAL THERAPY TO ADULT PATIENTS WITH AIDS UNDER THE UNIVERSAL HEALTH COVERAGE IN CHIANGRAI REGIONAL HOSPITAL

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บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อวิเคราะห์ต้นทุน-ผลได้ของการให้ยาต้านไวรัสเอดส์ ในการรักษาผู้ป่วยเอดส์ผู้ใหญ่ ภายใต้ระบบหลักประกันสุขภาพถ้วนหน้า ในโรงพยาบาลเชียงรายประชานุเคราะห์ ของปีงบประมาณ 2551 โดยวิเคราะห์ในมุมมองของผู้ให้บริการและผู้ใช้บริการ ศึกษาต้นทุนภายในและต้นทุนภายนอก สำหรับผลได้ คำนวณจากความเต็มใจที่จะจ่าย โดยวิธีสมมุติเหตุการณ์ให้ประเมินค่า ประชากรที่ศึกษามี 2 กลุ่ม คือ ผู้ให้บริการที่เกี่ยวข้องกับการให้บริการยาต้านไวรัสเอดส์ทุกคน และผู้ใช้บริการ จำนวน 200 ราย เป็นผู้ป่วยนอก 160 ราย และผู้ป่วยใน 40 ราย

ผลการวิจัยพบว่าต้นทุนการให้ยาต้านไวรัสเอดส์ ในปีงบประมาณ 2551 มีต้นทุนรวมเท่ากับ 11,366,561.18 บาท เป็นต้นทุนภายใน เท่ากับ 8,838,069.65 บาท และต้นทุนภายนอก 2,528,491.53 บาท ต้นทุนการมารับบริการผู้ป่วยนอกต่อครั้ง เท่ากับ 1,380.87 บาท และต้นทุนต่อวันนอน เท่ากับ 3,067.16 บาท ด้านผลได้พบว่าความเต็มใจที่จะจ่ายของผู้ใช้บริการของผู้ป่วยนอก เท่ากับ 681.70 บาท และผู้ป่วยในเท่ากับ 874.50 บาท อัตราส่วนผลได้ต่อต้นทุน ของผู้ป่วยนอก เท่ากับ 5.31 และผู้ป่วยในเท่ากับ 4.06 จึงสรุปได้ว่า การให้ยาต้านไวรัสเอดส์มีความคุ้มค่า ข้อเสนอแนะจากการศึกษาควรให้ความสำคัญกับการบริหารยาต้านไวรัสเอดส์และบริหารบุคลากรทั้งในระดับประเทศ และระดับพื้นที่ในโรงพยาบาลต่าง ๆ โดยการบริหารยาต้านไวรัสนั้น สามารถทำได้ด้วยการจ่ายยาให้ครบตามที่รับประทานจริง เพื่อช่วยเพิ่มประโยชน์ทั้งในการประหยัดต้นทุน และเพิ่มความร่วมมือในรับประทานยาต้านไวรัสเอดส์ของผู้ป่วย

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ART	Antiretroviral Therapy
ARVs	Antiretroviral drugs
CBA	Cost-benefit analysis
CDC	Centre for Disease Control and Prevention
CRH	Chiangrai Regional Hospital
CSMBS	Civil Servant Medical Benefit Scheme
Dpt.	Department
GPO	Government Pharmaceutical Oraganization
IPD	Inpatient department
LC	Labor cost
MC	Material cost
MCC	Medical care cost
MOPH	Ministry of Public Health
NAP	National AIDS Program
NAPHA	Nation Access to Aniretroviral Program for PHA (NAPHA)
OIs	Opportunistic infections
OPD	Outpatient department
RSC	Routine service cost
SSS	Social Security scheme
UC	Universal Health Coverage
UNAIDS	United Nations Program on HIV/AIDS

CHAPTER I
INTRODUCTION

1.1 Rationale and Justification of Study

In 1981, the Acquired Immunodeficiency Syndrome (AIDS) was first clinically identified and described in patients with symptoms of severe immunosuppression in the United States. This symdrome was characterized by immune abnormalities resulting from infection and destruction of CD4 T –lymphocytes. The new symdrome lacked an agreed-upon, accurate definition, and its causative agent was unknown. For this reason, the U.S. Center for Disease Control and Prevention (CDC) suggested that a combination of opportunistic infections and immunosuppression were indicative of "Acquired Immunodeficiency Syndrome" (AIDS) (Mahammed, I., & Nasidi, A., 2006). The virus so-called Human Immunodeficiency Virus or HIV that causes AIDS was identified in 1983 (Balint, G.A., 2001). The transmission of HIV that spread three ways; by sexual contact with an infected person, by sharing needles and/or syringes with someone who was infected, or, less commonly, through transfusions of infected blood, by babies born to HIV-infected women through breast-feeding after birth (CDC National Prevention information network, 1999). The first AIDS patient in Thailand in 1984 was found admitted at Ramathibodi Hospital (Suk, K., 2005). Since then the HIV spread quickly and became the number one cause of death of the population age between 15 and44.

The UNAIDS reported that the number of people living with HIV continued to grow in 2008, reaching an estimated 33.4 million. This was more than 20% higher than the number in 2000, and the prevalence was roughly threefold higher than in 1990 (UNAIDS, 2009). In Asia, the number of people living with HIV was estimated at 4.7 million. That included 350,000 people who became newly infected in 2008. Asia's epidemic peaked in the mid-1990s, and annual HIV incidence had subsequently declined by more than half. Asia was second only to sub-Saharan African in terms of the number of people living with HIV (UNAIDS, 2009). There

was an estimation in Asia that showed that Thailand was the second to Papua New Guinea in the number of people living with HIV (Ki-moon, 2008).

The Bureau of Epidemiology, Ministry of Public Health, Thailand had reported the HIV/AIDS situation collected from public and private health service facilities since 1984 through Febuary 2010 that the number of HIV-infected persons was 364,555 and the number of AIDS-related deaths was 96,598. Among those mainly were people aged 30-34 years (25.04%) who represented the working age population (Epidemiological Information Center, 2010). The Chiangrai province was second to Bangkok in the number of AIDS patients that had the cumulative number of AIDS patients of 23,931 and AIDS-related deaths of 11,794 (Epidemiological Information Center, 2010). In June 2008, the National AIDS Program (NAP) had registered 168,072 HIV/AIDS cases and patients under UC were 127,307 of whom 107,604 were receiving ART. In 2008, there were 2,782 accumulated HIV-infected cases registered from 1988-2007 at antiretroviral service clinic of Chiangrai Regional Hospital which included 2,057 (73.94%) HIV-infected patients under Universal Health Coverage Scheme and 1,790 under the NAP program as in October 2008. From such situation, the number of increasing HIV/AIDS cases and deaths from opportunistic infections in working age population had adversely affected the development of the nation. Consequently, antiretroviral therapy was given to prolong the patients' lives and keep the country's productivity level.

The antiretroviral therapy in Thailand has been developed since 1992. At the time, there was no antiretroviral therapy service through the regular health service system but only in research project. Thereafter, in the beginning the antiretroviral therepy was given from a mono-, double- and triple-drug therapy respectively. According to the guidelines of HIV/AIDS patients care management under Universal Health Coverage in the fiscal year 2007, it was suggested to give initial regimen to the naïve HIV cases comprises Stavudine, Lamivudine and Nevirapine (National Health Security Office, 2007). The Government Pharmaceutival Organization have produced a combination pill since 2002, which was basic regimen group A, under a trade name called GPO VIR S-30® (Kitajima, et al., 2003) which was the mostly used regimen or about 70-80% of all regimens. The outcome of antiretroviral therapy was evaluated through CD4 T cell and the level of HIV virus (or viral load) which was not only a

major clinical indicator which could predict subsequent disease and survival but also was the most important factor to indicate the success of the treatment (Montakarnkul, P., et al., 2007) and decide whether to initiate antiretroviral therapy and opportunistic infection prophylaxis (Kohreanudom, Chasombat et al., 2005; Department of Disease Control, Ministry of Public Health, 2006). In a previous study, the effectiveness of triple therapy of antiretroviral for 12 months, 51% of the subjects had plasma HIV RNA levels lower than 50 copies/ml and CD4 cell count increased over all trials (Bartlett, J.A., et al., 2001). In other study, assessment of antiretroviral therapy outcomes had other indicator, for instance, quality of life and satisfaction level of HIV/AIDS patients that had more score than pretreatment which represent of being healthier. (Jarurangsripong, J., & Bumrungyot, W., 2006)

In 2000, the formulated policy of The Royal Thai Government which was focused on access to care completely and continuously that every patient had equal opportunities to receive from the project "Access to care" such as triple ARVs and opportunistic infections (OIs) prevention and treatment. In 2004, Department of Disease Control, Ministry of Public Health had implemented national access to antiretroviral program for PHA (NAPHA) and the objective of the project was to expand the service to cover 50,000 HIV/AIDS patients. Then, in 2005 the number of patients who took antiretroviral drugs was 61,868. After, NAPHA had implemented for a while, it was found that there was an insufficiency of allocated budget to provide the service thoroughly and there was a lack of readiness of the service system and health care team. Consequently, the government installed antiretroviral therapy to the UC benefit package in the fiscal year 2006 (Lertpiriyasuwat, S., et al., 2006). In the first year, the received budget to provide services for AIDS and HIV patients under UC (HIV fund) was 2,700 million Baht that was less than the estimated budget of 4 billion Baht, so the budget management was necessary in order to provide the efficient service (Montakarnkul, P. et al., 2007). Until 2010, Nation Health Security Office (NHSO) received allocated budget of 2,770 million Baht from HIV fund. It was divided to reimbursement and capability buiding (Nation Health Security Office, 2010). Furthermore, the proposed fiscal 2011 budget was 3,400 million Baht that was more than previous fiscal year by 630 million Baht (Srisamit, R. 2010). The estimation of the budget used for the cost of antiretroviral drug in 2006-2010 was 65.3-74.3% of

total service budget, of that 42-49% was the budget for cost of basic regimen and 23-25% of total service budget was the budget for resistant regimen (Lertpiriyasuwat, S., et al., 2006). Due to inclusion of antiretroviral drug service into the UC benefit package, there was the need of many resources, for instance, medical supplies, public health center and service provider (Kunanuson, C., 2000). From the opinion of providers on the antiretroviral drug service under UC, they had anticipated there would be a loss and the insufficient of antiretroviral drug considering the high number of patients. As a result, those patients would not receive complete doses of antiretroviral drugs for the next follow up dates, there would be a delay in period of drug reimbursements and the price of the drug would be higher due to the drug resistance (Siriniran, P., et al., 2008). These were the reasons why the antiretroviral therapy services were complicated processes and also need a plenty of budget, and that it was necessary to estimate the budget to sustain with the cooperation from every segment to develop the better care for the adult patients with AIDS (Department of Disease Control, Ministry of Public Health, 2006).

Health resources were needful for the ART services however the scarcity of resources demonstrated that it was important to identify the better options to improve the efficiency of resource utilisation and budget allocation. Hence, cost-benefit analysis would help to facilitate in decision making process by measuring and valuing the benefit from ART service. The study frame of ART services evaluation could be valued in terms of monetary units (Penner, S.J., 2004). Currently, the economics studies on the antiretroviral therapy were mostly based on the studies of cost effectiveness analysis whereas there were less studies based on cost-benefit analysis (Boardman A.E., et al., 1996), therefore cost-benefit analysis study was recommended to be conducted (Bunmongkol, P. et al., 1998). The possibility of decision-making to focus on pre-evaluation of ART project --ARV for all AIDS under Universal Health Coverage -- to the practical one (Kulsomboon, W., et al., 2003), of which the results suggested that there was a need to conduct the cost-benefit study of post-evaluation as well, by focusing on both provider and patient perspectives. Futhermore, the result from this study could be used to inform how to manage the limited resources and to apply for antiretroviral service improvement at Chiangrai Regional Hospital.

1.2 Research Question

How much was the benefit–cost ratio of antiretroviral therapy in Chiangrai Regional Hospital (CRH) under Universal Health Coverage?

1.3 Research Objectives

1. General Objective

To perform cost-benefit analysis of antiretroviral therapy in adult patients with AIDS under the Universal Health Coverage in Chiangrai Regional Hospital (CRH)

2. Specific Objectives

1) To analyse internal cost of antiretroviral therapy elements under the Universal Health Coverage that was composed of direct cost and indirect cost in CRH.

2) To analyse external cost of patients elements which was occurred to the patients receiving antiretroviral therapy services under the Universal Health Coverage in CRH.

3) To analyse benefit of antiretroviral therapy under the Universal Health Coverage, by using the willingness to pay method in CRH.

1.4 Scope of the Research

This study was cost-benefit analysis of antiretroviral therapy of adult patients with AIDS under Universal Health Coverage in Chiangrai Regional Hospital The study was conducted by interviewing the providers involving ART services and patients with AIDS receiving antiretroviral drug, basic regimen group A, GPO VIR S-30®, who were registered in the NAP Program (National AIDS Program) and having medical records at Chiangrai Regional Hospital (CRH). The scope of the research was divided into two parts as follows:

Part 1: Cost was difined as the internal cost and external cost of antiretroviral therapy by analysing in point of view of both provider and patient. The

internal cost data were collected from departments involving ART services in the fiscal year 2008 (October 1, 2007 – September 30, 2008) and from the medical records. The unit of analysis of outpatient department was cost per outpatient visit, and inpatient department was cost per inpatient day. The external cost data of patients and relatives were collected by interviewing them at the time receiving ART services at the hospital in terms of cross sectional study.

Part 2: Benefit was valued by willingness to pay (WTP) method to identify the monetary value on antiretroviral drug under ART services in CRH. The contingent valuation method (CVM) is a direct method that involves asking patient questions about their willingness to pay.

1.5 Operational Definition

1. Patient with AIDS was a person who was diagnosed to have AIDS according to the criteria available in MMWR 1993 of the Centres for Disease Control (CDC).

2. Outpatient (OPD) is patient with AIDS who was diagnosed to have AIDS and received antiretroviral therapy at antiretroviral clinic of Chiangrai Regional Hospital.

3. Inpatient (IPD) is patient with AIDS who had been admitted the Department of Medicine in Chiangrai Regional Hospital.

4. Antiretroviral therapy is service including screening, diagnosis, antiretroviral drug dispensing and counseling.

5. Antiretroviral drug is Highly Active Antiretroviral Therapy (HAART), focus on the basic regimen group A that is GPO VIR S-30®.

6. Universal health coverage is one type of health security scheme in Thailand. The scheme aimed to cover a major part of population who was not covered by any type of health scheme. Most of the patients who received antiretroviral therapy under Universal Health Coverage must be in accordance with the criteria in the guidelines of HIV/AIDS patients care management under Universal Health Coverage in the fiscal year 2007.

7. CD4 is CD4+ T-cell count serves as the major clinical indicator of immune level in patients who have HIV infection. It is the most important factor in deciding whether to initiate antiretroviral therapy and opportunistic infection prophylaxis. Unit of measurement is cells per cu.mm.

8. Opportunistic infection is the disease caused from bacteria, fungi, virus and protozoa infection which occurred when HIV infected patient has the low level of immunity.

9. Cost is resource used in forms of monetary unit or expenses and non-monetary unit or opportunity cost. This study analysed focusing on both provider and patient perspectives that have being involved with antiretroviral therapy service in Chiangrai Regional Hospital.

10. Internal cost is the cost involved with antiretroviral therapy services in Chiangrai Regional Hospital in 2008 fiscal year in provider perspective, which comprised of:

Routine Service Cost (RSC) as follows:

Labor Cost (LC) is the expense that were paid to staff who had worked in department involving ART as well as their welfare in monetary form, including salary, wages, overtime wages, position allowance, allowance to children, medical expense, tuition fees and rental fee.

Operating cost is divided to material cost and public utility cost.

Material Cost is the expense related with materials, was used in antiretroviral therapy in 2008 fiscal year e.g. office materials, medical supplies and petrol.

Public utility cost is the expenses of water supply, electricity, telephone and postage in Chiangrai Regional Hospital.

Capital Cost (CC) is a cost of acquiring asset with working life time such as buiding cost, vehicle and equipment cost which was involving ART service, by calculated the annual depreciation cost. It is derived from the straight-line depreciation method and the duration of the equipment is 5 years, as the building is 20 years. The formula for calculating straight-line depreciation is:

$$\text{Depreciation Cost Per Year} = \frac{\text{Cost} - \text{Salvage Value}}{\text{Useful Life (years)}}$$

Cost is purchase price

Salvage value is estimated amount the asset could be sold for at end of its useful life. This is sometimes called residual value.

Useful Life is estimated amount of time that the asset would be used by hospital.

Medical care cost is the total cost occurred after patient received ART service from physicians, nurses and other staffs such as medication cost, nursing care cost, medical supplies cost, laboratory cost, radiation cost and other service cost.

11. External cost is cost borne by HIV patients and their relatives in both antiretroviral clinic and inpatient of medicine department, comprise of:

Direct medical cost is expense incurred to patient receiving ART service related to medical service such as, antiretroviral drug, laboratory fee, radiation fee, other special diagnosis service fee, and medical service charged.

Direct non medical cost is expenses that patients and their relatives spent from coming to the hospital to receive drug which involved with travelling cost, food cost and opportunity cost.

12. Benefit is valued by willingness to pay (WTP) by using contingent valuation method that set hypothetical situation for asking patients to value WTP in monetary form.

13. Cost-Benefit Analysis is the analysis based on the value of the cost and its benefit in order to calculate benefit-cost ratio which will accept the antiretroviral therapy project when benefit-cost ratio is more than 1.

14. Discounting is the way to produce a summary measurement of the net cost and net benefit of the project. All values have to be converted to values at a common point in time, before calculate cost-benefit ratio.

15. Sensitivity analysis is risk and uncertainty management in evaluating antiretroviral therapy service, especially when the condition or context changed.

1.6 Study Frame

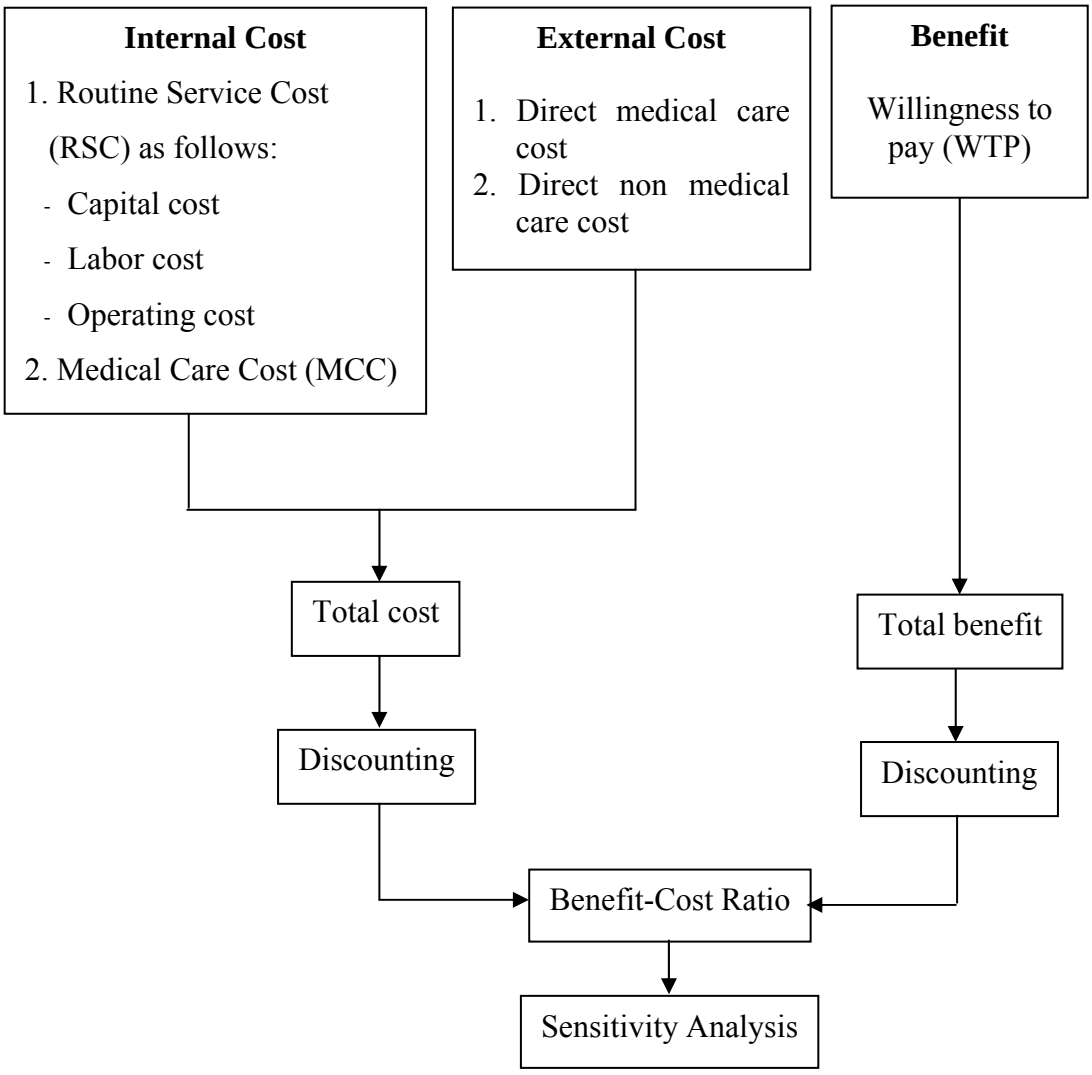

Figure 1 Study frame of cost-benefit analysis of antiretroviral therapy

CHAPTER II
LITERATURE REVIEW

The research focused on cost-benefit analysis of antiretroviral therapy under the Universal Health Coverage scheme in Chiangrai Regional Hospital. The scope of the related paper and literature is as follows:

2.1 AIDS and antiretroviral therapy under the Universal Health Coverage

2.2 Antiretroviral therapy service in Chiangrai Regional Hospital

2.3 Economic evaluation in health care

2.4 Cost theory and Cost-benefit Analysis

2.5 Willingness to pay

2.6 Relevant researches

2.1 AIDS and antiretroviral therapy under the Universal Health Coverage

This study was the cost-benefit analysis of the antiretroviral therapy in adult patients that might be explained for the understanding in AIDS, antiretroviral therapy and benefit package under Universal Health Coverage as follows:

2.1.1 AIDS and AIDS situation

Acquired Immunodeficiency Syndrome (AIDS) is an infectious disease from Human Immunodeficiency Virus (HIV) types 1 and 2. Most of AIDS patients were infected with HIV type 1. The transmittion of HIV spread in three ways, i.e. by sexual intercourse with an infected person; by sharing needles and/or syringes with someone who is infected, or, less commonly,through transfusions of infected blood; by babies born to HIV-infected women which may become infected before or through breast-feeding after birth (CDC National Prevention information network, 1999).

AIDS was first clinically identified and described in 1981, patients presenting with symptoms of severe immunosuppression in the United States. The level of immunization decreased, resulting in increasing the risk of opportunistic infections (OIs) which was not the only cause of various type of sickness but also the cause of increasing in HIV patients mortality rate (Department of Disease Control, Ministry of Public Health, 2004 & Mahammed, I., and Nasidi, A., 2006). The most common opportunistic diseases include; bacterial diseases, protozoal diseases, fungal diseases, viral diseases and HIV-associated malignancies.

The UNAIDS/WHO found that there was the declined rate of HIV infected in some countries but the overall HIV infected rate was still increasing worldwide. In 2008, the number of people living with HIV was estimated at 33.4 million (31.1-35.8 million) worldwide which comprised of 31.3 million (29.2-33.7 million) adults of which 15.7 million (14.2-17.2 million) were females, and 2.1 million (1.2-2.9 million) children under 15 years of age. The number of AIDS-related deaths was 2.0 million (1.7-2.4 million) and it was expected that the number of people newly infected with HIV will increase to an estimated 2.7 million (2.4-3.0 million) worldwide (UNAIDS, 2009). In Asia, the number of people living with AIDS was estimated at 4.7 million (3.8 million-5.5 million), South and South-East Asia was the second only to Sub-Saharan Africa. AIDS-related deaths occurred in Asia at an estimated 330,000 (260,000-400,000). With the exception of Thailand, every country in Asia had an adult HIV prevalence of less than 1% (UNAIDS, 2009). There was an estimation in Asia which found that Thailand was the second only to Papua New Guinea (Ki-moon, 2008). In Thailand, The Bureau of Epidemiology had reported that the total number of HIV infected patients since 1984 through Febuary 2010 was 364,555 of which most (25.04%) were between the ages of 30 and 34 and AIDS-related deaths of 96,598 (Epidemiological Information Center, 2010). The increasing number of HIV infected patients and the AIDS-related death rate which affected the country's development, the antiretroviral drug was brought to provide antiretroviral therapy in order to prolong patient life and sustained the country's productivity level.

2.1.2 Antiretroviral drug

Antiretroviral drug was the synthesized drug to inhibit or prevent interference with attachment and entry of HIV. The first ARVs was zidovudine (AZT) which became available in 1987 but effective treatment was achieved in 1996 with the advent of highly active antiretroviral therapy (HAART). The HAART initially based on two nucleoside reverse transcriptase inhibitors (NRTIs) and a protease inhibitor (PI). There are six classes (including two classes of entry inhibitor) of antiretroviral drug (Table 1).

Table 1 Currently available antiretroviral drugs by class

Class	NRTI	NNRTI	PIs	Entry/fusion inhibitors	Integrase inhibitors
Generic name	Abacavir Didanosine Emtricitabine Lamivudine Stavudine Tenofovir Zidovudine	Efavirenz Etravirine Nevirapine (Rilpivirine)	Atazanavir Darunavir Fosamprenavir Indinavir Lopinavir Nelfinavir Ritonavir Saquinavir Tipranavir	Enfuvirtide Maraviroc (Vicriviroc)	Raltegravir (Elvitegravir)

Source: A.C. Bailey & M. Fisher, 2008

The mechanisms of action in antiretroviral drugs (A.C. Bailey & M. Fisher, 2008) are as follows:

1. Two classes of drug act on the viral reverse transcriptase enzyme: NRTIs and closely related nucleotide reverse transcriptase inhibitor (NtRTIs) are nucleic acid analogues and work by terminating the DNA chain as reverse transcriptase copies viral to DNA. Non-nucleoside reverse transcriptase inhibitors (NNRTIs) block the enzyme by binding it tightly.

2. Protease inhibitors or PIs bind to the viral protease blocking cleavage of the viral amino acid chain to its constituent proteins.

3. Entry inhibitors currently available drugs bind to CCR5 receptors on immune cells, blocking their use as a co-receptor for cell entry by HIV.

4. Fusion inhibitors block gp41, a viral surface protein, preventing the conformational change necessary to allow fusion of viral and cell membranes, thereby preventing entry of viral nuclear material into the cell.

5. Integrase inhibitors block the integrase enzyme which incorporates viral copy DNA into the cellular DNA.

In 1987, the first production of ARVs was produced by Pfizer Company since then it had interested Thai government to formulate access to care policy, but the limitation was antiretroviral drug price. Therefore, in 1992 the research and development of the Government Pharmaceutical Organization (GPO) started to produce antiretroviral for domestic consumption and was subsequently produced mono-therapy, Zidovudine (AZT) in 1995. The GPO has developed antiretroviral drugs continuously and consequently applied for a patent to Department of Intellectual Property for GPO-VIR, a cocktail antiretroviral combined with Stavudine 30-40 mg, Nevirapine 200 mg and Lamivudine 150 mg, through procedure combine together to single table in 2002. The success of the research and development in this medication enabled the patient to obtain effective antiretroviral drug at 50-90% lower price than original drug price. The patients could increasingly access to the antiretroviral therapy which was worth the expenses, especially with limited budget (The Medical News, 2004).

2.1.3 Antiretroviral therapy service under Universal Health Coverage

The Bureau of AIDS, TB and STIs, Department of Disease Control was getting ready for the antiretroviral therapy service for HIV/AIDS patients under the Universal Health Coverage Scheme and cooperated with Nation Health Security Office (NHSO) to formulate policy and the guidelines of HIV/AIDS patients care management under the Universal Health Coverage. Thereafter, the government installed antiretroviral therapy to the UC benefit package in the fiscal year 2006

(Lertpiriyasuwat, S., et al., 2006). However, the project had been completely implemented since April 1, 2007 until now (NHSO, 2008) by using the budget from HIV fund, which was the fund for health services of patients with HIV/AIDS and TB allocated by NHSO at 2,796 million Baht. This was less than proposed budget of 4,460 million Baht, so the prudent of budget management was necessary in order to provide the efficient services (Montakarnkul, P., et al., 2007). In 2010, NHSO received allocated budget of 2,770 million Baht from HIV fund. It was allocated for service reimbursement and service system development. Furthermore, the proposed fiscal 2011 budget was 3,400 million Baht which was 630 million Baht more than the the previous fiscal year (Srisamit, R., 2010). The budget summary was shown in Table 2.

Table 2 Summary of Universal Health Coverage Scheme budget

Budget (million Baht)	**FY 2009 [received]**	**FY 2010 [proposed]**	**FY 2010 [received]**	**FY 2011 [proposed]**
1. Capitation budget (million Baht)	103,551.14	127,902.25	113,437.94	135,098.20
- Population under UC (person)	47,026,000	47,239,701	47,239,700	47,996,562
- Capitation rate (Baht)	2,202.00	2,707.52	2,401.33	2,814.75
2. The fund to provide services for AIDS and HIV patients	2,983.77	2,915.63	2,770.85	3,400.27
3. The fund to the last stage of kidney failure condition	1,530.07	1,928.37	1,455.44	4,097.55
4. The fund to control, prevention and treatment of metabolic disease	0	1,079.38	304.59	1,162.99
5. The fund to promotion public health service – psychiatry patient service	0	1,742.34	0	528.26
5.1 promotion for primary care services	0	988.20	0	0
5.2 promotion service of high mortality rate diseases	0	754.14	0	0
Total (million Baht)	**108,064.99**	**135,567.96**	**117,968.83**	**144,287.27**

Source: Srisamit, R., 2010.

The estimation of the budget used for cost of antiretroviral drug in 2006-2010 was 65.3-74.3% of total service budget. Of this 42-49% of the total service budget was used for cost of basic antiretroviral regimen and 23-25% was for resistant regimen (Lertpiriyasuwat, S., et al., 2006). The inclusion of antiretroviral drug service into the UC benefit package had induced the need for tremendous usage of resources, i.e. medical supplies, public health center and service personnel (Kunanuson, C., 2000). From the opinion of service provider on the antiretroviral drug service under UC, the service provider had anticipated that the hospitals would be losing money and the antiretroviral drugs would be insufficient for all the patients. As a result, the patients would not receive complete doses of antiretroviral drug up to their next follow up appointment, the drug dispensation would take a long time, and more expensive drug might have to be used due to drug resistance (Siriniran, P., et al., 2008). From the above it showed that treatment service by using antiretroviral drugs was a complicated process and needed high budget. It was necessary to estimate the budget to sustain with the cooperation from every segment to develop the better care for the HIV/AIDS patients (Department of Disease Control, Ministry of Public Health, 2007). The design of the appropriate UC benefit package of ART was important starting from searching for the patients who should have obtained the ARVs and then treating the patient with starting regimen as long as possible. In addition, suitable guidelines in changing regimen and assessing the antiretroviral drug resistance should be established. As a result the NHSO determined this guideline as a handbook of HIV/AIDS patient care management under the Universal Health Coverage in the fiscal year 2007 and facilitated as communication mean so that all the health care centers under UC would have the same understand (Nation Health Security Office, 2007).

The handbook of HIV/AIDS patient care management under the Universal Health Coverage in the fiscal year 2007 identified the benefit packages by dividing it to four packages as follows:

1. Treatment including antiretroviral drugs

1.1 Antiretroviral therapy (ART) was the dispensing antiretroviral drug to HIV infected patients who had indicating conditions according to the set criteria. The objective was to prohibit the increasing of HIV virus in patient's

body. This will result in higher immunity level and safer from opportunistic infections or cancer. The patients would live longer in the society and have better quality of lives. The patients entitled to receiving ART must be Thai national who had 13-digit identification number, under Universal Health Coverage, and registered with National AIDS Program (NAP). In case the patients did not have 13-digit identification number (e.g. alien workers), the patients must be the old patients registered in NAPHA project before 1 October 2005 only, must meet the medical indicators e.g. clinical criteria and/or immunological criteria, strictly followed the physician's treatment plan and must not be under any prohibition of receiving ART. The excluded condition was those who were under civil servant medical benefit scheme or social security scheme, could not obtain treatment continuously, and under any prohibition of receiving ART.

1.2 Treatment of Opportunistic Infections (OIs) covered all opportunistic infection diseases that could occur to AIDS patients, especially Cryptococcosis and Tuberculosis. The objective was to treat AIDS patients with opportunistic infection diseases. The service eligibility conditions were those who were registered in the National AIDS Program (NAP) and were diagnosed by the physicians that the sickness occurred from opportunistic infections. Those not covered in the UC were those under civil servant medical benefit scheme or social security scheme.

1.3 Treatment of hyperlipidemia that is the condition occurred when cholesterol level is higher than the appropriate level resulting in risk of atherosclerosis and cardiovascular diseases. The objective was to decrease the risk of atherosclerosis caused by hyperlipidemia after taking ARVs. The service eligibility conditions were that the patients must be registered in the National AIDS Program (NAP), must receive antiretroviral drug induce hyperlipidemia, have medical indicator that it was necessary for the patients to obtain antihyperlipidemia drug and must be those who had failed dietary therapy and therapeutic lifestyle changes. Those who were not covered were those under civil servant medical benefit scheme or social security scheme.

2. Laboratory testing for diagnosis and follow up covered all laboratory testing to diagnose HIV infection and follow up treatment during receiving antiretroviral drug. The laboratory testing especially at the service unit would receive

an additional budget apart from normal capitation budget. The laboratory testing was divided into three groups, i.e. basic laboratory testing, immunity level and virus level testing, and PCR testing to diagnose infectious condition in infants who were born from HIV infected mother. The objective was to diagnose and follow up both before and during receiving antiretroviral therapy. Those who were eligible to receive the service were the patients registered in National AIDS Program (NAP), taking antiretroviral drug, for asymptomatic patient only CD4 testing can be diagnosed, and other special conditions. Those excluded from the services were those under civil servant medical benefit scheme or social security scheme.

3. Voluntary Counseling & Testing (VCT) for people with high risk behavior in getting infected was the consulting service to evaluate the risk behavior in order to set the guideline to reduce the risk and to treat infection case and also to test the blood to find HIV infection. The counselor would give the advice to the patients both before and after the blood testing. After given advice the patients could choose whether to accept blood test or not. This was in accordance to the patient's right and confidentiality. The objectives of this package were to identify the asymptomatic HIV infected patient, to provide choices to the patients in reducing risk, to decrease the number of new infected cases and to give the correct advice of self care. Those included in the coverage were similar to the antiretroviral treatment condition, with the addition of those who had doubt that they had risk behavior and asked for voluntary counseling and blood testing, those who clearly had risk behavior, those whose spouses were tested HIV positive, couples who desired to have blood testing before marriage and who had medical indicator of opportunistic infection. Those not covered were those who already tested HIV positive, screening test before operation, testing used to fulfil the business transaction, job application, educational application, entering the monk hood, annual health check up, prenatal care of HIV infected mother, and blood testing for insurance application.

4. Positive prevention was the prevention of HIV dissimination among infected patients and people receiving VCT. Those eligible for the services were those who were Thai national, registered in National AIDS Program (NAP), including those who received VCT service at counseling clinic. Conditions not covered were condom using campaign in general public and in HIV risk group.

Furthermore, NHSO had identified the criteria to consider when to start antiretroviral in adult patients with AIDS in the guidelines of HIV/AIDS patient care management under Universal Health Coverage in the fiscal year 2007 (Nation Health Security Office, 2007). In detail the considerations to start the antiretroviral in adult patient with AIDS were from two factors, i.e. clinical signs and symptoms, and CD4 level. The goal of treatment by antiretroviral drugs was to continuosely suppress the HIV virus in order to improve immune system and to reduce the risk of opportunistic infections. The antiretroviral regimens have four regimens as follows:

1. Basic regimen group A is the initial regimen for naïve patient who has indicator to start ARVs. The recommend regimen was respectively as follows:

d4T + 3TC + NVP (GPO VIR S-30®) or

d4T + 3TC + EFV or

AZT + 3TC + NVP (GPO VIR Z-250®) or

AZT + 3TC + EFV

This study focused on patients who were taking ARVs that was the first basic regimen group A, d4T + 3TC + NVP (GPO VIR S-30®)

2. Basic regimen group B is the regimen that has indicator to recommend in patients who could not tolerate the adverse drug reaction or were allergic to regimen group A. The recommend regimen was respectively as follows:

d4T + 3TC + IDV + RTV or

AZT + 3TC + IDV + RTV

3. Basic regimen group C is the alternative regimens to be used in case there was a limitation to treat with groups A and B, or used in patients with hepatitis B virus coinfection. This regimen must be approved by AIDS medical experts. The recommend regimen was respectively as follows:

ddI + 3TC + EFV or

ddI + 3TC + NVP or

TDF + 3TC + EFV or

TDF + 3TC + NVP or

ddI + 3TC + IDV + RTV or

TDF + 3TC + IDV + RTV

4. Resistance regimen group D is the regimen in case the treatment failed from the resistance of antiretroviral regimen groups A, B and C. This regimen must be approved by AIDS medical experts. The recommend regimen was respectively as follows:

d4T + 3TC + Boosted PIs or
ddI + 3TC + Boosted PIs or
AZT + 3TC + Boosted PIs or
AZT + ddI + Boosted PIs or
AZT + TDF + Boosted PIs or
TDF + 3TC + Boosted PIs or
NVP + Boosted PI (in case of resistance to NRTI class only)
EFV + Boosted PIs (in case of resistance to NRTI class only)
AZT + 3TC + TDF + Boosted PIs

- Fisrt choice Boosted PIs: IDV/RTV
- Second choice Boosted PIs: LPV/RTV
- Third choice Boosted PIs: ATV/RTV

2.1.4 Managing Antiretroviral Drugs Supply and Stock Management

The antiretroviral therapy was a nationwide service. The machanism of success was the antiretroviral drug supply management that should be principle activity and duty. In 2005, the Bureau of AIDS, TB and STIs in the Department of Disease Control determined the guidelines of managing antiretroviral drugs supply and stock management for the understanding of implementor and involved officers about the interner-based Vendor Managed Inventory (VMI) system in NAPHA period. As a result of the implementation, hospitals and health care centers could conveniently manage ARVs. There were two ARVs management systems (Jirawattanapisan, 2005) as follows:

1. The imported-ARVs management system through the network was appropriate in way that managed the resources from the center to the regions or vertical program under cooperation of Bureau of AIDS, TB and STIs of the Department of Disease Control which was responsible for resources procurement to support and pass on to the regional Offices of Disease Prevention and Control which

were the regional coordinating network through the provincial health care centers or hospitals participating with the program and the service receivers. The need for provincial network system was important in order to prepare and sustain ARVs management system in future.

2. Antiretroviral drug management using VMI (Vendor Managed Inventory) system was developed by the Department of Disease Control and the Government Pharmaceutical Organization to be used nationwide. The VMI was the system that the vendors kept and managed the inventories after entering the sale contract with the government. The vendors would preriodically deliver the medical supplies to the determined destinations within the specified lead time of delivery when level of the medical supply stock reached the re-order point. This system made the ARVs management more convenient, reduced the loss due to expiration of the over-stocked ARVs, and reduced the stock of the medicine. The medical supply inventory was appropriately stocked to ensure the continuity and consistency.

In 2006, NAPHA was changed to NAP which was managed by NHSO. Since July 1, 2007 the antiretroviral drug supply and stock management had been developed for NAP to be linked to VMI. This enabled the actual drug dispensation for individual patient could be done, which was called NAP-VMI version 3 system (Nation Health Security Office, 2007). After that, the system was changed to Maxlimit antiretroviral system on April, 30 2010 (Government Pharmaceutical Oraganization, 2010).

2.2 Antiretroviral therapy service in Chiangrai Regional Hospital

This study was cost-benefit analysis of antiretroviral therapy under Universal Health Coverage at Chiangrai Regional Hospital (CRH). Thus the basic information of CRH must be obtained to know how the ART involved with each department in the hospital. The organization chart of the CRH is presented in Figure 2.

CRH was first established in 1936 with 50 beds. Then, CRH had been expanded till 2002 to 2010 when the number of beds reached 756. It was a hospital receiving the patient refered from the community hospitals in Chiangrai province. This

hospital gave the medical services to those covered under three major medical insurance schemes, i.e. the Civil Servant Medical Benefit Scheme, the Social Security Scheme and the UC scheme. It served 227,118 populations living in Muang district. One of 30 CRH's OPD clinics was the clinic for patients with AIDS, which provided ARV drug dispensation and also admission services to male and female wards of the Department of Medicine. The antiretroviral therapy of CRH had serviced under UC since October 1, 2006 from 13.00 to 16.00 on Monday and Wednesday, and from 8.00 to 16.00 on Thurday. It was the one-stop service, starting from the eligible patients who received ART (Figure 3) would make an appointment with HIV-coordinator at antiretroviral clinic. The new patients would be provided with the appropriate education about ART and AIDS to get ready and evaluated before entering the ART (Figure 4). If the patients were not ready, they would be educated individually. For those who passed the evaluation they would receive ART. Appointment would be made for this group of patients. The ART started with the patients showing their appointment card to AIDS network workers to be ready for the screening and assessing the adherence by counting the pills. Then the patients would meet with the nurse for the assessment of problems and adherence by self-report method using Visual Analog Scale. If there was no need to meet with physician, the ARV drugs would be gave to them by nurse according to the previous medical record. For those who needed to meet with physician they would be examined by the physician before the ARV drugs would be dispensed to them by the pharmacist (Figure 5). In case the physician found that the patients needed to be admitted, the nurse of antiretroviral therapy clinic would contact with the inpatient department for futher treatment (Figure 6).

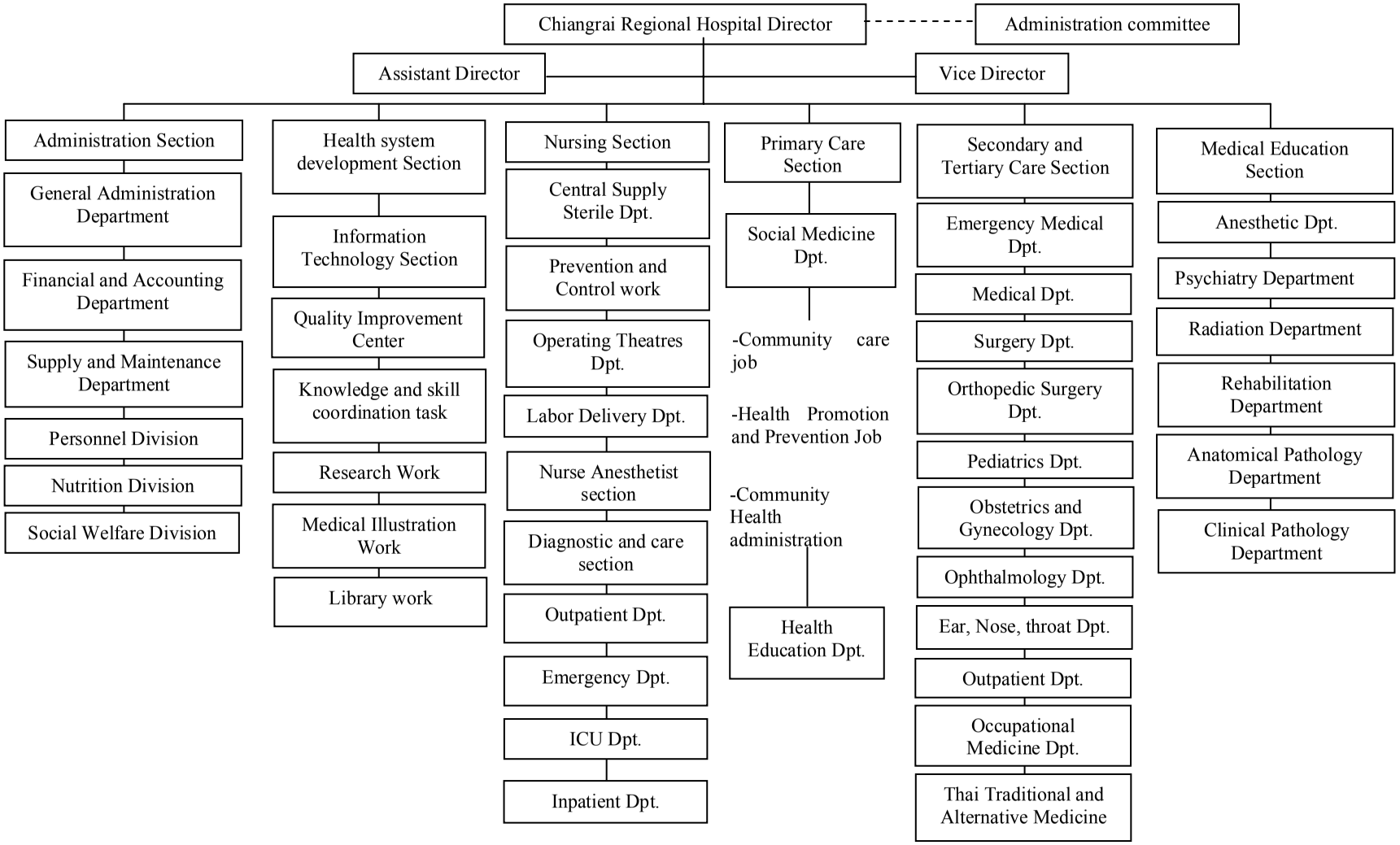

Figure 2 Organization Chart of Chiangrai Regional Hospital

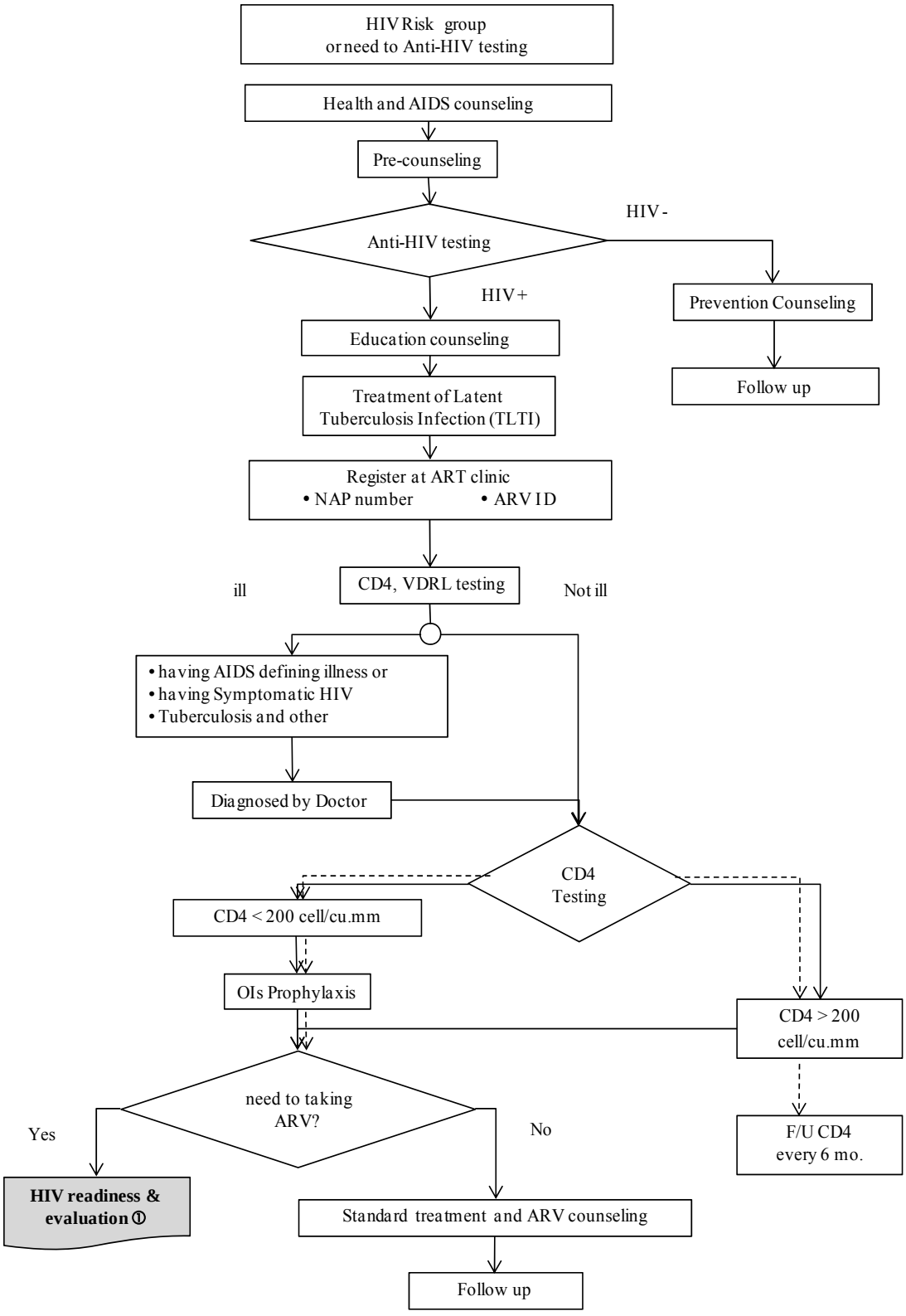

Figure 3 Diagram showing antiretroviral therapy service for adult HIV/AIDS patients at Chiangrai Regional Hospital

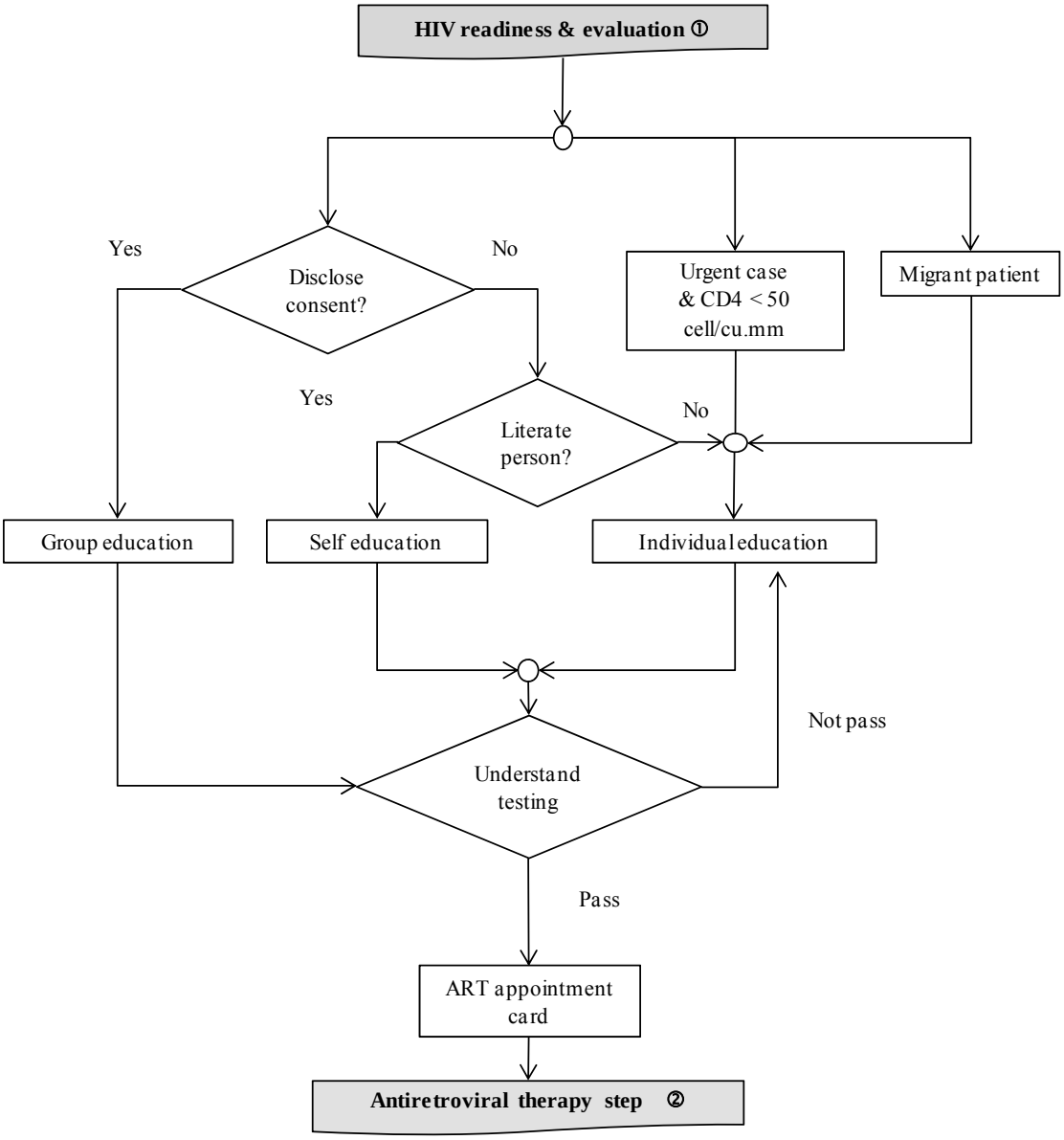

Figure 4 Diagram of preparation of readiness & evaluation before antiretroviral therapy

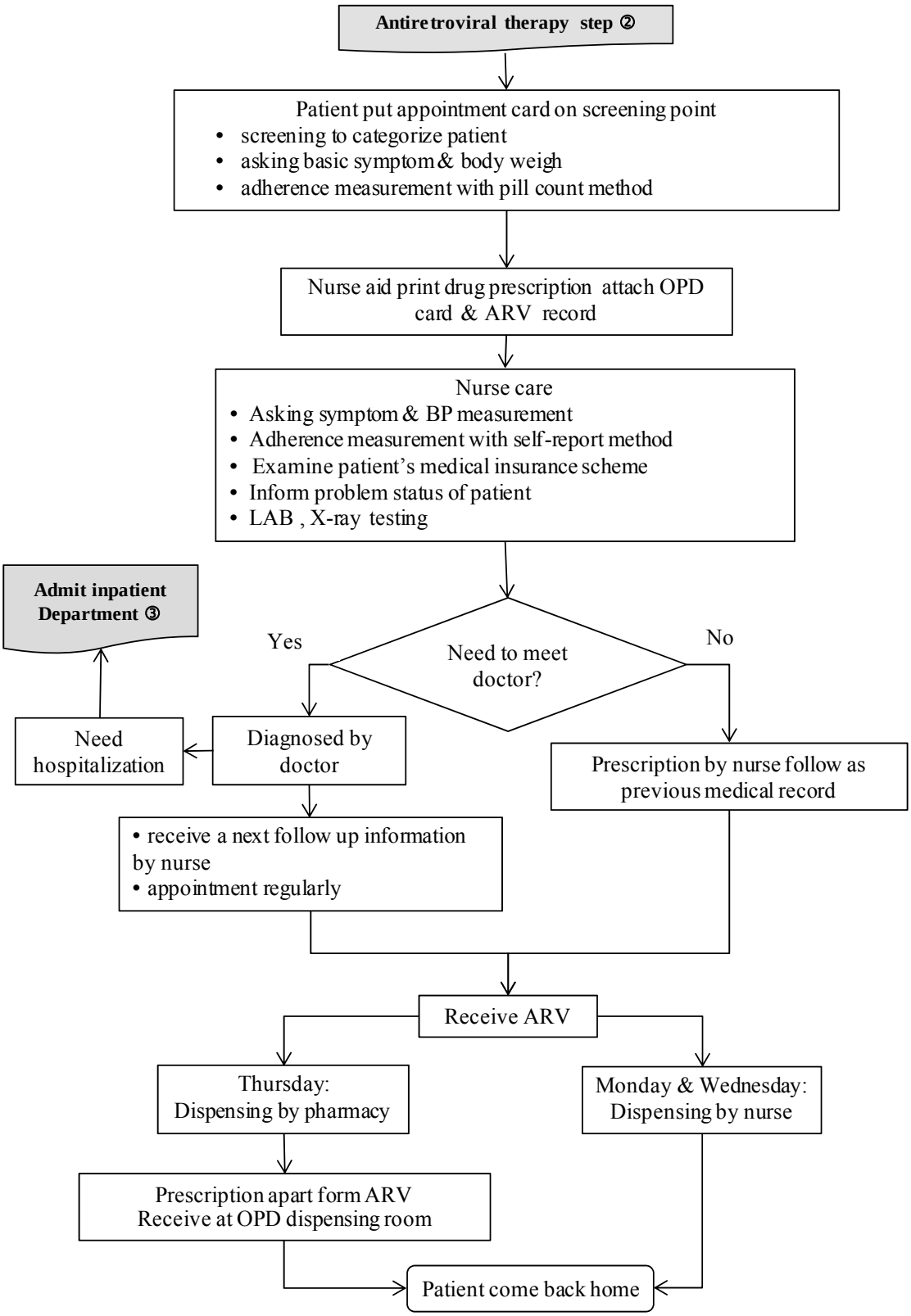

Figure 5 Diagram of steps in antiretrovitral therapy service

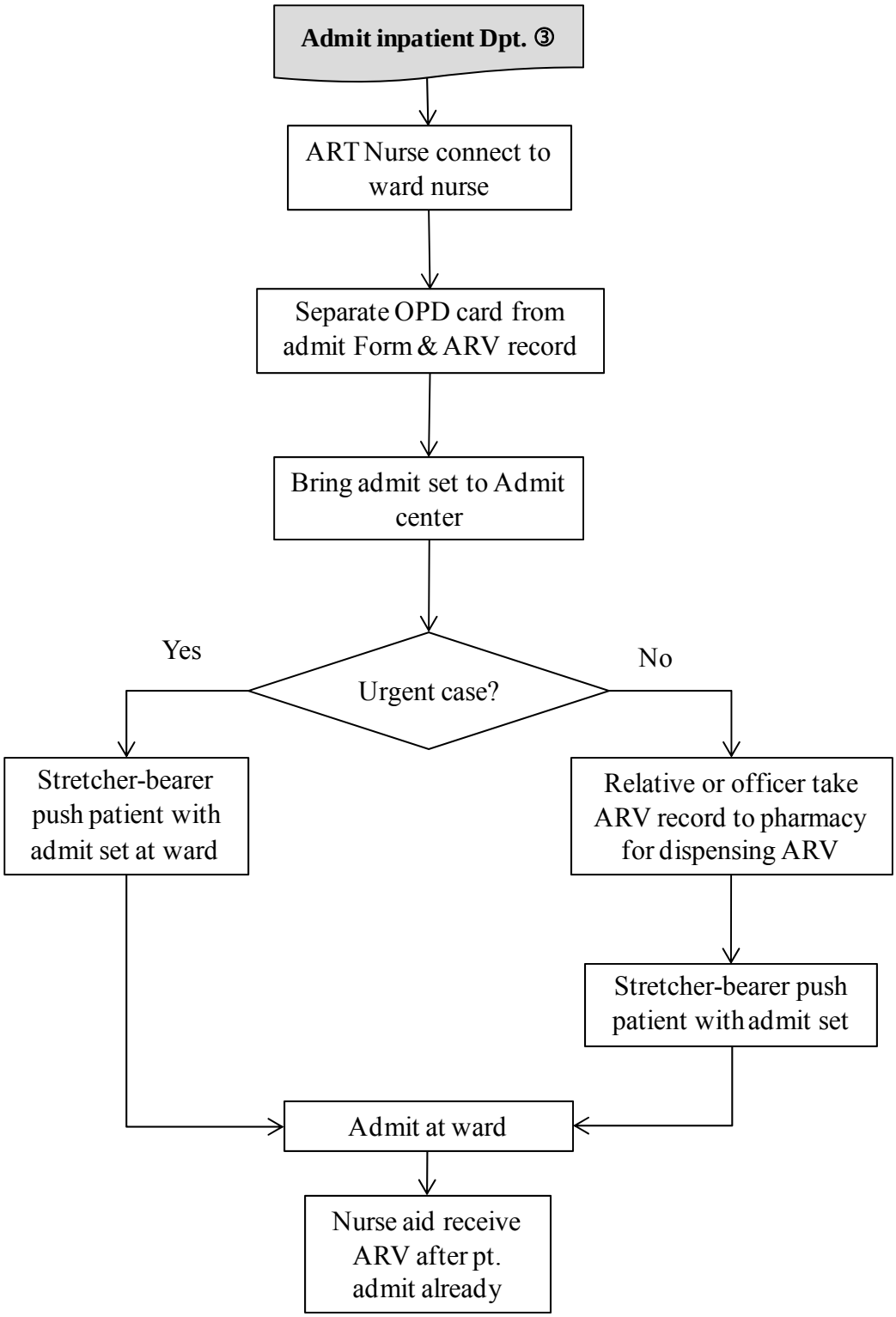

Figure 6 Diagram of hospitalization of adult patients with AIDS

2.3 Economic evaluation in health care

Samuelson, P.A. (1976) defined economic as "the study of how people and society end up choosing, with or without the use of money, to produce various commodities and distribute them for consumption, now or in the future, among various persons and groups in society. It analyses the costs and benefits of improving patterns of resource allocation".

Lee, K. & Mills, A.J. (1979), the public health economists, had given the definition of health economics as "the application of the theories, concepts, and techniques of economics to the health sector. It is thus concerned with such matters as the allocation of resources between various health-promoting activities; the quantity of resources used in health service delivery; the organization and funding of health service institutions; the efficiency of preventive, curative and rehabilitative health services on individuals and society."

Health economics process is important for public health development because it helps develop the public health work to yield the highest efficiency. That means utilization of the limited resources to efficiently obtain the highest efficiency for example, the service quality improvement to enhance service quality and to raise the level of hygiene of the public by apply the studies about costs and benefits for decision-making in health care services (Lertpiriyasuwat, S., et al., 2006 and Suksirisereekul, S., 2008).

The economic evaluation is a technique used to help in decision-making both pre-implementation and post-implementation. It assists the priority setting, planning, budgeting and evaluating (Lertpiriyasuwat, S., et al., 2006 and Suksirisereekul, S. 2008).

The four methods of economic evaluations (Robinson, R. 1993) are:

1. Cost-minimization analysis (CMA) is an appropriate form of evaluation used when there is a reason to believe that the outcomes of the procedures under consideration are the same. This analysis concentrates on identifying the least cost option.

2. Cost-effectiveness analysis (CEA) is an appropriate technique used when the outcomes of the different procedures or programs being

considered may be expected to vary. The outcomes are expressed in common natural units.

3. Cost-utility analysis (CUA) is used to refer to the subjective level of wellbeing that people experience in different states of health. The measurement of utility is in terms of quality adjusted life years (QALYs).

4. Cost-benefit analysis (CBA) is restricted to the forms of evaluation in term of a monetary value on benefits or outcomes.

There are 9 main steps in economic evaluation methods in health care (World Health Organization, 2000) as follows:

1. Defining the economic questions and the perspective of the study
2. Determining the treatments to be evaluated
3. Choosing the study design
4. Identifying, measuring and valuing the costs of the alternative treatments
5. Identifying, measuring and valuing the benefits of the alternative treatments
6. Discounting costs and benefits at different timing
7. Measuring the incremental costs and benefits
8. Analyzing the results from the costs and benefits
9. Testing the sensitivity of the results

2.4 Cost theory and Cost-benefit Analysis

2.4.1 Cost

Cost in the viewpoint of the economist means the used resources both in monetary term and non-monetary term including negative consequences which is non-expenses and intangible, but the estimated value is set and included in cost (Kaewsonthi, S. & Kamolratthanakul, P. 1991).

Cost is the value of resource, input or expenses used to provide service. In economics term, cost occurs when the resource is used for an activity and can not be reused for any other activities. Subsequently there is a loss of value from not using the resource in other alternative production so called opportunity cost (Srirattanabun, J. 2008)

Cost means the loss of resource in terms of benefit or monetary value in order to achieve the desired objective (actual value expensed) (Rewpaiboon, A. 2006).

The objectives of cost analysis (Rewpaiboon, A. 2006)

1. To improve the efficiency of service of the organization
2. To prepare the budget and negotiate the service rate
3. To evaluate the pilot project
4. To evaluate the optimum alternatives of resource utilization

2.4.2 Perspective

In each evaluation, it is important to set the perspectives of the analysis. There generally are 5 perspectives (Rewpaiboon, A. 2006):

1. Societal perspective is the broadest perspective. It includes cost from service provider and service receiver (including their relatives) from both public and private sectors.

2. Public sector perspective could be specifically set in the ministry level e.g. Ministry of Public Health, Ministry of Social Development and Human Security or the total cost of all units in public sector as government cost.

3. Payer perspective means the perspective of the units which purchase the services from service providers or health care centers in order to provide the services to the service receivers or patients who are under the responsibility of the relevant units e.g. insurance companies, Social Security Office, Nation Health Security Office.

4. Provider perspective will refer to the cost incurred with service providers e.g. hospitals, health centers, foster homes and sanatorium.

5. Patient or consumer perspective refers to the cost incurred with patients and their relatives in exchange for the services received.

2.4.3 Cost classification

Kaewsonthi, S. & Kamolratanakul, P. (1993) summarized the criteria used to group and classify the costs as follows:

1. Cost as classified by using “cost bearer” criteria

Cost can be classified into 2 main groups by the types of cost holders, i.e. the cost incurred within the service providing organization called “internal cost” and cost incurred outside the organization called “external cost”, e.g. cost incurred to service receivers or community. This kind of cost classification is very important in planning and formulating of health service policy.

2. Cost as classified by using “activity based” criteria

Both internal and external cost can be classified into 2 groups: those that are the direct costs of the activity called “direct cost” and the others are cost of supporting activity called “indirect cost.”

3. Cost as classified by using “payment” criteria

There are 2 groups classified by payment criteria: cost that is actually paid called “explicit cost or tangible cost” and cost that cannot be seen and not actually paid called “implicit cost or intangible cost.”

4. Cost as classified by using “medical” criteria

Medical criteria are medical cost and non medial cost.

Srirattanabun, J. (2008) classified costs according to the objectives as follows:

1. Cost as classified by its origin

This is a preferred method which divides cost into 2 groups: capital cost and operating cost (running cost). These operating costs usually are recurrent costs because these costs usually occur continuously while the health care centers open for operation.

1.1 Capital cost is the cost incurred due to the depreciation with the aging of the buildings, medical equipment and office equipment, which are invested and utilized in the long term.

1.2 Labor cost is the operating cost from all the compensation to operating staffs, which can usually be in monetary terms e.g. salary,

wages, overtime wages, child allowance, medical expenses, tuition fees and rental fee, etc.

1.3 Material cost is the cost of various types of the supplies used, e.g. office supplies, house and kitchen works, medical supplies, food, medical science materials, engineering work and public utility expenses, such as electricity, telephone, postage, water supply expenses including maintenance, and some types of medical equipment that can be classified as material. This group of cost is actually the operating cost which is non-labor operating cost.

2. Cost as classified by relationship with products

2.1 The direct costs are labor cost, material cost and capital cost that can incured in the service or product providing units, which connected to the products.

2.2 The indirect costs are labor cost, material cost and capital cost allocated from other units to service units as the service units must use the services from other units, such as service support units and administration units. Thus costs from the service support units and administrative units would be proportionally allocated and distributed to the service units in the hospital.

2.4.4 Cost of illness

Rewpaiboon, A. (2006) explained the cost of illness as the economic burden of diseases or illnesses to the society. In using cost of illness data, other types of costs such as direct and indirect costs of the illnesses were also known. The data were also used to set priority of the illnesses to be supported in the budget used to solve problem or in the researches. Moreover the data were also used in evaluation of health economics, e.g. cost-benefit analysis, cost-effectiveness analysis. There were two calculation approaches:

1. Prevalence-based approach was the calculation of costs incurred to everybody who were diagnosed to have the diseases during the period of the study, which generally was one year. This also included the patients who were sick before or during the study. This approach was suitable for diseases of which the results

of the treatments were visible in rather short time and not chronic. The result of this approach was the average cost of illness per year.

2. Incidence-based approach was the calculation of the costs incurred to particularly new patients, who started getting sick during period of study, which generally was also one year, then the cost data would be collected until the patients got well or passed away. This approach was suitable with chronic diseases, e.g. diabetes, hypertension, etc. The data collecting in this approach was more difficult than that of the prevalence-based approach. The result of this study was the life disease costs.

Kobelt, G. (2002) had divided costs of economic evaluation into three groups as follows:

1. Direct medical costs were costs incurred from diagnosis, basic treatment, follow-up, rehabilitation and terminal care. They were costs of treatments in the hospitals, including any other services such as home care, nursing care. In treating a patient there were two methods of calculations:

1.1 Top-down or Macro costing

This method was the allocation of costs from non-revenue producing cost centre (NRPCC) and revenue producing cost centre (RPCC) to be the indirect costs of patient service (PS) and combined with the direct costs of PS to yield the full cost. When divided the full cost by the total number of patients who received the services, the result was the unit cost. By using this method the details of the cost of individual patient would not be known. Generally, it was the calculation of the average cost per outpatient or inpatient. The average unit cost of each specific group could be known. The patient service units were divided specifically into specialty departments such as AIDS inpatient wards or specific disease clinic.

1.2 Bottom-up or Micro costing

This method was the collecting of the data that how many days each individual patient received the service and what amount of services he or she got, then multiply by the unit cost of each service. The outcome was the total cost of each service. When adding these unit costs together, the total cost of that particular patient would be obtained. This method obtained more detailed than the

top-down or macro costing. It could be also used in other analyses, such as cost equations. However, reference source of each type of service cost must exist or calculated.

2. Direct non-medical costs were the costs that incurred from the illnesses or treatments, but they were not parts of the treatments, such as society services, travelling expenses, accommodating equipment and informal care. The cost of informal care means other cares apart from care from medical staffs. Those who gave the informal care comprised of family members and friends who gave services without being financially compensated. The measurement could start from the time absent from work that was spent to take care of the patients, resting time, and sleeping time that could be valued as the opportunity cost. Moreover, there was still the impact on quality of life.

3. Indirect cost had the same meaning as the productivity cost, such as the loss of social productivity from sick leaves, loss of efficiency of work, inability to work, premature death during working age, etc.

2.4.5 Cost-benefit analysis

Getzen, T.E., and Allen, B.H. (2007) explained that the cost-benefit analysis (CBA) was a set of techniques used for assisting in the decision-making that transformed all relevant concerns to monetary terms.

Surarattadeacha, C. (2545) described about cost-benefit analysis that was a technique used to estimate the value of comparing significant costs (direct cost, indirect cost, intangible cost and externality cost) and benefit in order to results in changing the resource allocation in the economics. It was suitable when the decision had to be made to solve the problems in single intervention policy or alternatives policy that was valuable for the implementation, e.g. when the benefit was more or equal to the cost. An example of the CBA policy question was from the social perspective whether it was worth to instead of continuing the current HIV/AIDS prevention campaign, using mass media campaign or companion acknowledgement in STIs treatment campaign and what kind of infectious prevention that could bring the most of health benefit results.

Thanawiriya, S. (2551) described that the cost-benefit analysis was the analysis of both cost and benefit in monetary terms and the comparison of the costs and benefits of each program to see if it was worthwhile to invest.

There are three general approaches to the monetary valuation of health outcomes:

1. Human Capital

Thanawiriya, S. (2551) explained on human capital approach that each human is like capital goods or useful machinery in both present and future and also has different useful lifetime. For convenience in evaluation, the analysis often uses the income of which the man could earn from his working lifetime as the benefit measurement.

Drummond, M.F., et al. (2005) mentioned that human capital method places monetary weights on healthy time using market wage rates and the value of the program is assessed in terms of the present value of future earning.

2. Referential assessment

Thanawiriya, S. (2551) mentioned on referential assessment that it wa evaluated by referring to the law, policy or life insurance company, e.g. social security law that has specified to support 20,000 Baht to death or the insurance company that specified the payment for each death in accordance with the agreement, etc. This principle of this evaluation assumed that life's value could not be evaluated while still alive but it could be easily done after death in the form of lost expenses. However, this method of evalution could yield the extremely different outcomes so that it was difficult to decide which value should be used. Moreover, the same person could be valued differently depending on how the evaluator related to the person being assessed.

3. Willingness to pay

Thanawiriya, S. (2551) mentioned on the measurement of the willingness to pay that it was how much the program gave back the return by asking the persons who were beneficially affected by the program the maximum money they were willing to pay I order to sustain the program, and asking persons who were

adversely affected the minimum money they were willing to get paid for the compensation. Using this method usually faced problems in getting actual answers. Those who were negatively affected often tried to set a high compensation. Those who got positively affected tried to offer the lowest expense.

Kaewsonthi, S. & Kamolratanakul, P. (1993) and Thanawiriya, S. (2551) mentioned on technique of cost-benefit analysis that about the analyst could use one of the three principles in presenting the values.

1) Net Present Value (NPV) of a project or regulation is the present value of the estimated benefits minus costs. In mathematical terms, it is expressed as

Net Present Value = Present Value (Benefit - Cost)

$$NPV = \sum_{t=1}^{n} \frac{(B_t - C_t)}{(1+r)^t}$$

The project is acceptable when NPV > 0

2) Internal rate of return (IRR) describes the discount rate (r) at which the present value of costs equals the present value of benefits.

The project is acceptable when market interest rate (R) > r

3) Benefit-Cost Ratio (BCR) could be calculated in three formulas as follows:

(1) Gross BCR = $\frac{\Sigma \text{ Benefits}}{\Sigma \text{ Costs}}$

The project is acceptable when B/C > 1

(2) Net BCR = $\frac{\Sigma \text{ (Benefits-Costs)}}{\Sigma \text{ Costs}}$

The project is acceptable when Net BCR >0

(3) Net-Benefit-Investment Ratio = $\frac{\text{Net Benefits}}{\text{Capital Costs}}$

The project is acceptable when when NBIR >1

For this study, Gross BCR formual was used as the principle in the decision making to find Benefit-Cost Ratio.

Cost-Benefit comparison can be managed in 2 ways;

1. The comparison between cost and benefit in the forms of physical unit. This kind of comparison is one of the favorable ways in measuring effectiveness of the intervention e.g. treatment cost per inpatient day.

$$\text{Cost per inpatient day} = \frac{\text{Cost of inpatient care}}{\text{No. of patient x average days spent in the system}}$$

$$\text{Cost per outpatient visit} = \frac{\text{Cost of outpatient care}}{\text{Number of service provided}}$$

This kind of comparison was clear and easily implemented especially in case the direct results could be immediately measured. For this reason, the effectiveness evaluation of the program by using this comparison was a favorable method.

2. The comparison between cost and benefit in monetary terms. The cost-benefit analysis/comparison in general is the cost analysis of activity/program to decide which program or alternative is the best, that is the most effective in economics perspective or in order to decide which program should continue or be abolished. The comparison of cost and benefit must be discounted to the same point in time.

Thomas E. Getzen (2007) explained on the goal of using cost-benefit analysis that it helped in decision making in which the benefits (B) were greater than costs (C) or B > C. But suppose benefits or costs were uncertain. CBA would be based on the best possible information. The job of analysts was to get the best estimate and to explain the alternatives. An option is chosen if:

(Probability of Gain) x (Benefits) > (Probability of Loss) x (Cost)

This formula separates the uncertainties (Probability of gain/loss) and the values (benefit/cost) that are involved in the decision-making process.

2.4.6 Discounting

Edejer, T.T., et al, (2003) mentioned on discounting that it was the process of converting future values to their present values. The discrete time formula for estimating the present value of any stream of costs is:

$$\text{Cost}_{\text{present value}} = \sum_{t=0}^{T} \frac{\text{Cost}}{(1+r)^t}$$

Kaewsonthi, S. & Kamolratthanakul, P. (1991) and Tanawiriyakul, S. (2008) mentioned that in cost-benefit analysis in the monetary form since the value of money was different in the past and in the future, the discounting was brought to compute the future value to the present value at the year of the analysis. The rate used to adjust cost or benefit in the past or future to present value form was called discounting rate. In general interest rate was often used as discounting rate to compare the value of money over time. Present value formula included,

1. Formula used to convert future into present value:

$$C_0 = C_n / (1+r)^n$$

Where C_0 = Cost or Benefit at present year

C_n = Cost or Benefit at year n

r = Discounting rate

2. Formula used to convert past value into present value:

$$C_0 = C_t / (1+r)^t$$

When C_0 = Cost or Benefit at present year

C_t = Cost or Benefit at year

r = Discounting rate

2.4.7 Sensitivity Analysis

Edejer, T.T., et al. (2003) defined that sensitivity analysis shows the impact on the cost-benefit ratio of varying parameters. The "one-way" analysis was the assessment of the uncertainty occurred from varying a variable one at a time, while the others remained at their base-case specifications. This was in order to examine the effect of each component on the results. A "multi-way" sensitivity analysis involved varying two or more inputs at the same time, and studying the effect on outcomes.

Thanawiriya, S. (2008) and Kaewsonthi, S. & Kamolratanakul, P. (1993) mentioned that the reason why the sensitivity analysis must be done was that the data used in the decision tree were sometimes based on risk and uncertainty so the sensitivity analysis was introduced to facilitate the decision making in order to reduce the risks and uncertainties arose in the project or decision making process. The sensitivity analysis of project was the study of the outcome from changing parameter value e.g. discounting rate, cost, benefit and time to see which parameter was sensitive and subsequently affected the project evaluation the most. In general, one parameter would be changed at a time by changing the value to a certain percent, e.g. 5%, 10%, 20%, etc then tried to compute the results to find which parameter influenced NPV or IRR. The variables used to test the sensitivity of project usually were the main variables that could possibly affect the project in the future. There were two favourable methods in the trial in assumption changing which were:

1. Change the chance each alternative would occur
2. Change the outcome value

2.5 Willingness to Pay

Bala, M.V., et al. (1999) defined that the willingness to pay was the maximum amount of money that person would pay for the treatment or intervention that restored a person to good health while maintaining the same level of overall well being.

Bala, M.V., et al. (1999) and Bayoumi A. M. (2004) defined that method used for benefit evaluation, mostly is contingent valuation method was used. It has been accepted in evaluation the willingness to pay to be used in cost-benefit analysis

in monetary terms. The method could be used to evaluate both technical efficiency and allocative efficiency in health service and other units. It also helped in collecting benefit data due to the method used was not covered. By using this method, the respondents would be asked what was the maximum money the beneficiary were willing to pay in order to maintain the project if they were sick. The question structure consisted of three components:

1. The change of project could be either the introduction of a new program or the removal of an existing program.
2. The program change could be associated with either an increase or a decrease in quality of life (QoL).
3. The respondents could be asked either how much they would be willing to pay for the program (if it was associated with a gain in QoL) or how much they would be willing to pay to maintain the program (if it was associated with a gain in QoL).

The reason for the lack of popularity of CBA in health economics (Bala, M. V., et al., 1999).

1. The perception that the WTP methodology is not capable of providing accurate and reliable estimates of benefits.
2. The responses to WTP questions are likely to be affected by the respondent's income.

There are several potential reasons for the recent interest in willingness to pay (Bala, M. V., et al., 1999).

1. The considerable progress has been made in the willingness to pay elicitation methodology and in WTP estimation techniques. As improvements occur in the design of surveys, stated WTP values will get closer to actual values.
2. The alternative method - CEA – also requires monetary valuation of health benefits before a decision can be made as to whether a new treatment is good value for money.
3. The willingness to pay offers a better potential for capturing all relevant patient, option and altruistic value benefits of a new health intervention.

2.5.1 Contingent valuation method

Bala, M. V., et al., (1999) and Drummond, M.F., (2005) mentioned on contingent valuation method was a popular method used to measure the willingness to pay, of which the assumed situations about the program were used in the surveillance. The respondents were encouraged to think about the contingency of an existing actual market for a program or health benefit and to reveal the maximum they would be willing to pay for such a program or benefit.

Pearce, et al. (2006) summarized that elicitation formats of CVM questions had various formats e.g. open-end question, bidding game, payment card, single-bounded dichotomous choice, double-bounded dichotomous choice. In this study open-end questions were used in the interviews to obtain willingness to pay as benefit.

Suksirisereekul, S. (2008) mentioned on the interviewing of WTP that was complex and difficult to answer because these questions do not occur often in daily life and were difficult to refer from the experience or general life principles. Since the WTP answers during the measurement was in monetary terms so the results would be the same as the results from the measurement. This method was valid as long as it met the three following principles:

1. Due to uncertainty of health care need, the question should be "How much money are you willing to pay for the insurance premium in order to obtain health care service if need be?"
2. The result of the computation should be in the form of the probability.
3. The person giving the answers must be the good representation of the population that involve the health care program under evaluation.

2.5.2 General approach for conduction a CVM survey

Step 1
Define the Objectives of the survey

- Description of the site
- What services are being values?
- Who is the relevant population?
- Time span of valuation
- Establishment of value to be estimated and unit of measurement

Step 2
Preliminary decision about the survey (Questionnaire, visual AIDS etc)

- Size of the sample? Who will be surveyed? Who will pay for the good? Who will use the good? Realted questions

Step3
Questionnaire Design

- Design the survey based on initial interviews and/or focus groups for designing the survey
- Introduction (consisting of general information about the site)
- Socioeconomic information
- Scenario formulation
- WTP/WTA elicitation format
- Payment vehicle
- Pretest the questionnaire

Step 4
Actual survey implementation

- Dicide the sampling technique
- Decide how, when and where to run the interviews
- Training of enumerators
- Running the interviews

Step 5
Compile, analyze and report the results

- Enter the Data
- Analyze WTP/WTA using appropriate statistical techniques
- Identify any responses that may not express the respondent's value for the site
- Deal with possible non-response bias
- Get an estimate of Willingness to pay
- Eatrapolate the benefit of the loss for the entire population
- Compute annual net benefits
- Compute total value of environmental services

2.5.3 Bias

Bayoumi, A.M., (2004) mentioned on bias could occur in using the contingent valuation elicitation process and that systematically deviated the measured contingent valuation amount from an individual's true valuation. Biases could occur when respondents received information, when they processed it, or when they reported their answers. Although some biases could be measured, a good practice for all contingent valuation studies was to include debriefing questions to understand the rationale for respondents' answers and qualitatively assess the likelihood of biased responses. Biases are described in Table 3.

Ninan, K.N., (2008) described that bias in CVM, which was the interviewer's conduct and interviews could influence responses. Therefore, to minimize this problem, the well-trained so professional interviewers should be used in the interviews to reduce this type of bias.

Table 3 Biases in contingent valuation (CV) studies

Bias	Description	Methods to minimize bias
Sampling bias	Respondents chosen to answer a survey did not represent the population being studied, such as convenience samples	Assess representativeness of study sample. Use population-based sampling when feasible
Editing bias	The tendency for individuals to 'revise' the information they was received during the CV interview	Consider how health states were described and the nature of the monetary benefit. Assess respondents' answers and ensure consistency
Sequencing or question-order bias	The tendency for respondents to provide different answers was up to a sequence of questions depending on the order in which the questions are presented	Present questions in random order

Table 3 Biases in contingent valuation (CV) studies (Cont.)

Bias	Description	Methods to minimize bias
Anchor-point bias	The tendency for individuals to report values close to the initial bid that was offered	Randomly alter the initial bid, use range- finding methods, frame questions as referenda
Probalility preference	The tendency for individuals to 'weight' probabilities non-linearly, such that they placed great value in events that had probabilities that were near certainty (0 or 1)	Assess sensitivity of responses to altering probabilities presented in the elicitation tasks, such as probability of illness when purchasing insurance
Loss aversion	The tendency for individuals to assign greater weight to a loss than to a corresponding gain	Ask respondents to consider both gains and losses inherent in a new intervention
Hypothesis bias	The tendency for individuals to provide answers that were higher than they would pay in a real market because the exercise was hypothetical	Ask respondents what goods they would substitute or forego if they were actually paying the amount they specified in a willingness to pay exercise. Remind respondents of budget limits if answers seem implausibly high. Measure magnitude of bias and calibrate responses (further details are available elsewhere
Social desirability bias	The tendency for respondents, when answering questions, to provide what they perceived to be the desired response rather than their true valuation	Include a debriefing component with CV studies to qualitatively assess respondents' reasoning when answering questions

Table 3 Biases in contingent valuation (CV) studies (Cont.)

Bias	Description	Methods to minimize bias
Protest zero bias	The tendency for respondents to answer that they would not pay (or accept) any money for the program in question, not because they did not value it, but because they objected to the CV exercise	Encourage respondents to avoid protest zero responses. Allow respondents to select prefer not to answer' a question and record responses as missing, rather than zero
Non-response bias	The tendency for respondents to avoid answering questions altogether	Encourage respondents to provide explanations for their choice as part of the debriefing component of the valuation

Sorce: Bayoumi, A.M. (2004)

2.5.4 Validity

Bayoumi, A.M., (2004) mentioned on validity assessment whether the answers accurately reflected what respondents would be willing to pay if the market truly existed. The strongest test of validity was to compare respondents' answers with actual amounts paid in a market. Such tests were: rare but, when they had been completed, the test indicated that hypothetical valuations overstated real market rates. Additional tests to assess the responses are:

1. Internally consistent, for example, the amount individuals were willing to pay for several programs should not exceed their entire budget.

2. Face validity assesses whether the questionnaire seems reasonable and plausible.

3. Construct validity tests whether expected relationships were demonstrated. For example, respondents with higher incomes should generally be willing to pay higher amounts than individuals with lower available incomes.

4. Criterion validity by comparing the stated willingness to pay to what the respondents were actually willing to pay. The difference between the

stated and actual willingness to pay could be reduced by improving the survey design. Loomis et al (1996) summarized the result of their study that improved the wording of the reminder made after extensive pretesting and debriefing with pretest respondents in the paired samples which provided additional insight about how they determined their WTP in the hypothetical and actual WTP, by reminding respondents:

Not to bid what they thought the good might sell for in a store.

To act as if they were in a real market.

To take their household budget and available funds into consideration when bidding.

The wording of the WTP (no reminder) question was "You are being asked to participate in a hypothetical sealed bid for this print. We would like to know the maximum amount of money you would pay to take this art print with you at the end of this session, if this one art print were actually for sale, and you would have to pay by August 19, 1994. Now please write down the maximum dollar amount you would be prepared to pay for this art print. I would bid $....."

The wording of the WTP (with reminder) question was "You are being asked to participate in a hypothetical sealed bid auction for this print. We would like to know the maximum amount of money you would pay to take this art print were actually for sale. At this time in the survey, we are not asking what you think the art print might sell for in a store or what you think its fair price is. Rather, we want to know the maximum amount of money that you would honestly be prepared to pay your bid amount with cash, write a check today, or sign a Promissory Note payable on or before August 19, 1994. Please take into consideration your budget and what you can afford to pay. If what you would pay is different from what you judge a fair price to be, that is OK. We want to know what you would actually be prepared to pay for the art print. Take a few moments to think about what you honestly would be prepared to pay for this art print if it were being offered for sale to you today and it would go to the highest bidder. Although the question is hypothetical, we want you to answer as if it were real—as if you were participating in a real sealed- bid auction and would really have to pay your dollar amount if you were the highest bidder".

2.5.5 Reliability

Bayoumi, A.M. (2004) mentioned that reliability referred to the consistency of a measurement upon the repeated evaluation. When a respondent's situation had remained unchanged (such as when the tests were repeated over a short-time interval), a reproducible measurement would yield consistent results. When a respondent's situation had changed over time, a responsive measurement would reflect that difference.

A CBA may be computed that includes only the patient benefits associated with the healthcare intervention. To estimate the net benefits to the patients, the estimated average willingness to pay per patient would be subtracted by the average cost per patient. The result of the evaluation was usually influenced by the incomes of the respondents. To control for the effect of income on the WTP estimates, a linear or nonlinear regression analysis could be performed to estimate the relationship between WTP and income in the surveyed population. If the relationship was linear, any desired income value could be chosen to represent the population of interest and the mean WTP at that income level was estimated from the regression equation. (Bala, M. V., et al., 1999)

Net benefit = total patient benefit - total cost expected for that population

Total patient benefit = mean WTP per patient x No. of interested population

2.6 Relevant Researches

The relevant researches involved with cost of HIV/AIDS patients care and cost-benefit analysis related to antiretroviral therapy and efficacy of antiretroviral drug that was reviewed as follows:

2.6.1 Related researches in cost and cost-benefit analysis

Kongsin, S., et al. (1993) applied the descriptive method to study on the cost components in the "Hospital Care Cost Analysis of Patients with AIDS and AIDS Related Complex in Hospitals under the Ministry of Public Health". The analysis in

both provider and patient perspectives, the study showed that the cost components included (1) routine service cost by using the retrospective data base from the Division of Provincial Hospital during 1988-1991, (2) medical care cost by using the retrospective data from the available medical records of patients during 1988-1992, and (3) external cost to the relatives of the patients which was cross-sectional prospective data derived from inspection interview questionnaires collected in regional and general hospitals. It was found that the routine service cost (labor and operating cost) was Thai Baht 341.19 per IP day, the medical care cost (laboratory test, procedures and medication cost) was Thai Baht 4,236.47 per case, and the external cost to the relatives of the patients was Thai Baht 1,153.91 per case. The aggregation of the routine service cost and the medical care cost was the "Hospital Care Cost". This study was able to help in predicting resources needed for the AIDS medical care.

Kitajima, T., et al. (2003) studied hospital care cost of the patients with HIV/AIDS in Khon Kaen that aimed to estimate expenses and costs of providing highly active antiretroviral therapy (HAART) to the adult patients with AIDS under Universal Health Coverage (UC) in Khon Kean province, especially both outpatient and inpatient services of Khon Kaen Regional Hospital and the Northeast Regional Infectious Hospital. The inclusion criteria included who resided in Khon Kaen and made outpatient visit at and/or those who were discharged from those hospitals from 1 December 2001 to 28 February 2002. It was found that the average cost per outpatient visit of those with and without ARVs were US$ 294.2 and US$ 26.2, respectively. The average cost per inpatient day with and without ARVs was US$ 368.1 and US$ 43.8, respectively. In summary, the net annual cost of HAART was estimated to be US$ 5,674,629.

The study of costs of HIV medical care in the era of highly active antiretroviral therapy of **Gebo, K. A., et al. (1999)** in the United state of America to described health care cost of Medicaid of patients infected with HIV in Maryland have changed in the setting of HAART. The study design was observational cohort study that analysed economic and clinical data of patients from the Johns Hopkins HIV service, the provider in primary and sub-specialty care. All patients were enrolled in Medicaid and received care in Maryland from 1 January 1995 through 31 December 1997. From the results it was found that hospital inpatient payments decreased

significantly in all CD4 strata for patients on a protease inhibitor-containing regimen whereas pharmacy payments increased significantly. Inpatient payments associated with treating opportunistic illnesses were lower in 1996-1997 for patients receiving protease inhibitor therapy compared with those not receiving protease inhibitors. In conclusion, protease inhibitor-containing antiretroviral regimens were significantly lower hospital inpatient and community care costs, as well as lower costs associated with the treatment of opportunistic illnesses. Even with the concurrent increase in their pharmacy costs, total health care costs were stable or slightly lower for these patients.

The study of medical care cost analysis and quality of life of AIDS patients by **Jarurungsipong, R. & Bumrungyot W. (2006)** at the Bangjak Hospital during 2004 – 2005 was descriptive research that studied the direct medical care cost, non-medical care cost, indirect cost of patients, and the outcome of providing antiretroviral therapy to AIDS patients, e.g. clinical outcome (CD4), physical outcome, quality of life and satisfaction level. The subjects were 60 patients with AIDS who had CD4 less than 200 cells/ cu.mm using purposive sampling. It was found from the result that post-antiretroviral therapy period, the medical care cost has declined in all aspects due to ART affected to higher level of CD4 in HIV infected/AIDS patient which reduced the treatment cost for opportunistic infectious diseases, decrease hospitalization and also the quality of life and satisfaction level was higher than pre-antiretroviral therapy. The results of this research could be used to recommend the formation of the HIV/AIDS patient care management policy based on the principle of resource distribution and allocation to yield the highest efficiency for quality services.

The study of cost-benefit analysis of screening HIV-Antibody (AIDS) in venereal disease patients at Bangrak Venereal Diseases Clinic by **Kongsin, S. (1990)** illustrated two models of cost-benefit study: the All Cases HIV Test Model and the Some Cases HIV Test Model. The benefit could be calculated from the number of populations that could protect themselves from HIV by calculating from the inverted treatment resources and the number of venereal diseases patients who was prevented to contract AIDS to find the future lost income that would not be wasted.

Kulsomboon, V., et al. (2003) studied cost-benefit analysis of triple antiretroviral therapy as a benefit of universal health care coverage. The objective of

this study was to obtain the cost-benefit data of antiretroviral therapy and suggest policy options of government subsidization of antiretroviral therapy for all AIDS patients in the universal health care coverage program. Cost-benefit analysis was employed using treatment cost and outcome data from Bumrasnaradoon Hospital. Additionally, a group of local health officers was interviewed to visualize scenarios of implementing the ARVs program. Cost-benefit data were used to calculate the consecutive annual budget required in adding the ARVs into the UC benefit package. The results indicated that the average annual treatment cost of individual patient in the ARVs group was 87,168 Baht and the cost in the non-ARVs group was 11,115 Baht. Undergoing the ARVs, the cost incurred by opportunistic infections, decreased by 9,143.04 Baht per patient per year. Cost-benefit analysis of the selected three options was conducted and compared. Each option was calculated using drug cost data from three different sources; Bumrasnaradoon Hospital, GPO-vir from governmental production organization (GPO), and the Access to Care Project (ATC). The results indicated that the cost-benefit ratios of GPO-vir option were 2.68 - 2.94 which rendered it the most efficient. The estimated long term annual costs for ART full coverage ranged from 4,000 to 11,000 million Baht per year. After adjustment using the incremental costs from non-ART, the costs became 1,400 - 8,500 million Baht per year within the first 5 years if this benefit was to fully cover in 5 years. The calculations might vary based on these circumstances including (1) the effectiveness of GPO VIR in terms of adverse drug reaction and drug resistance, (2) the reduction of ARVs price based on the drug patent status, and (3) the decreasing number of the new HIV cases based on the prevention program. To obtain the successful outcome of the ARVs provision, it was required that (1) the health service institutions should establish standard counselling system emphasizing patient's resolution to have the ART, (2) the networks of patients living with AIDS (PLWA) should be recognized and participate in the counselling and monitoring process, and (3) the health service officers should have adequate training for their readiness to provide ARVs. The study suggested that ARVs should be included in the UC program.

The study of health care contingent valuation studies: A review and classification of the literature by **Diener, A. et al. (1998)** was the research review and classification of the study of Contingent Valuation Method (CVM) were published

between 1984-1996 in the journals related to economics, medical and health services, of which the objectives were to show the results of the literatures in quatitative term and demonstrate the basic evaluation using CVM and how to use CVM in health services. There were 48 CVM studies that met the criteria, of which the studies were conducted in 1984 – 1996 and evaluate the benefit in monetary terms by using CVM which assessed the Willingness to Pay (WTP) or Willingness to Accept (WTA). It was found that 42 CVM studies undertook money valuation in the context of cost benefit analysis 95% of the studies evaluated by measuring WTP and 5% by measuring WTA. Most studies were administered by mail (52%) with 38% being in-person interviews. Value elicitation techniques included open-ended questions (38%), payment cards (19%) discrete choice questions (26%) or bidding games (29%). Some form of construct validation tests, and tests to find particularly associations between WTP and income, were done in 21 studies (50%).

2.6.2 Related Researches in antiretroviral outcome

The study of adherence to antiretroviral medication among HIV-positive patients by **Maneesriwongul, W.L. et al. (2006).** A sample of 149 Thai patients receiving ART at Bhumrasnaradura Infectious Disease Institute completed a structured questionnaire and reported medication adherence on a 30 day visual analog scale. HIV RNA test results were abstracted from the medical record. It was found that the adherence ranged from 25% to 100%. The median was 100% and the mean was 96%. The majority of the subjects (114, 77%) had an HIV RNA less than or equal to 50 copies/mL. An undetectable viral load was associated with adherence more than or equal to 95% (odds ratio [OR] = 3.0; 95% confidence interval [CI] 1.3 to 7.1; P = 0.02) and with a lower mean number of months on ART (22 versus 32 months; P = 0.03). Gender, educational level, method of payment, use of GPO VIR, and whether or not the patient was on his or her initial ARVs regimen were not associated with an undetectable viral load. In the multivariate analysis, only length of time in months was associated with an undetectable viral load. For each additional month, the odds of being undetectable were 0.975. (OR = 0.975; 95% CI 0.954 to .996; P = 0.02).The conclusion that adherence was high in this cohort and was associated with HIV-RNA levels. However, these data confirm that adherence was only one factor that

determined the effectiveness of ART. Duration of treatment was associated with virologic failure, and controlling for adherence.

The study of **Chaichompoo, P., (2005)** showed the estimation of the efficiency of antiretroviral therapy on the change in CD4, body weight, opportunistic infections and change of drug formula during the treatment. The scope of study was in the area under responsibility of The Office of Disease Prevention and Control 5, Nakhonratchasima on the HIV infection and AIDS patient group who received the treatment at least 1 year. The data were collected from the patient medical records in the computer program of Department of Disease Control. The data were then copied to the pre-prepared record forms, which included personal data, length of time of infection before receiving antiretroviral drugs, records of receiving ARVs before entering the project, CD4 level, body weight, opportunistic infections and drug formula changing. The data were analyzed into average, percentile, standard deviation. From the research it was found that before receiving the antiretroviral drug 231 patients had an average of CD4 level of 34.08 cells per cubic millimetre, and the average body weight was 49.08. After receiving antiretroviral drug an average CD4 level increased more than 200 cells per cubic millimeter within 1 year and 475 cells per cubic millimeter in the third year, and the average body weight increased by 3.12 kg within 6 months and 4.75 kg in the 12 months. When the patients were grouped by using CD4 level at the time of the beginning of treatment, i.e. 0-100, 101-200 and 200+, it was found that every group had the positive CD4 result. The group that started the treatment when the CD4 level was not too low could respond to the treatment better. Opportunistic infections rate within 1 year was found to be 12.12% and 18.18% changed drug formulas. The service providers should develop patient screening process, communication process in order to provide information to patients so that they could receive the treatment faster and study more on opportunistic infections including exchange experience or knowledge in service provider team and develop maintenance system continuosely.

Chargcheung, S., et al., (2008) studied quality of life of the HIV infected and AIDS patients in Teparak district, Samutprakan province and Darn Khunthod district, Nakhonratchasima province by in-depth interview. The study showed the effects in many ways, i.e. on psychological effect, it was found that 3 in 4 patients felt

despaired and disappointed; on physical effect, most patients felt exhausted and worried; on family effect, 3 in 4 patients did not had family effect (acceptable); on social effect, half of the patients said that community rejected them; and on economic, effect, 3 in 4 patients said that their ability to work was less or had no job which affected in lower income rate. 1 in 4 patients had low income card so they did not have to pay for the treatment but there were some patients who took herbal medicine, which costed around 4,800-10,000 Baht per year plus transportation cost of 600-1,000 Baht each time.

CHAPTER III
RESEARCH METHODOLOGY

The analysis of health care service system by using economic evaluation is a quantitative research method. In this study, cost-benefit analysis had been used for antiretroviral therapy service evaluation under universal health coverage in Chiangrai Regional Hospital. This study was directly on cost and benefit that could be estimated to value in monetary terms. The methodology about this study is shown in the following details.

3.1 Research Design

This study was quantitative research that calculated benefit-cost ratio both in patient and provider perspectives. The Internal cost data were retrospectively collected in fiscal year 2008 (1 October 2007- 30 September 2008), as external cost and benefit were cross-sectional descriptive study. The cost-benefit analysis studied the HIV/AIDS patients who had taken ART specifically GPO VIR S-30® regimen, according to different outcome, changing CD4 level caused to ART adherence that was assessed by self report with Visual Analog Scale tool.

3.2 Study Population

There were two groups of population in this study; the first group was providers involved with ART service in HIV clinic and Department of Medicine in Chiangrai Regional Hospital and the second group was AIDS patients who recieived ART service under Universal Health Coverage Scheme (UC) in Chiangrai Regional Hospital.

3.2.1 Sample size

The provider sample groups were all providers involved with ART service in Chiangrai Regional Hospital.

The patient sample groups were AIDS patients who recieived ART service under Universal Health Coverage Scheme (UC) in Chiangrai Regional Hospital. They had been interviewed in order to collect data both external cost and willingness to pay for ART service. The formula for calculated sample size of patient group in this study is as follows;

$$n = \frac{NZ^2pq}{NE^2 + Z^2pq}$$

When n is the number of sample size

p Is the proportion of ART receiver who had the CD4 level increase more than 50% (compared between CD4 at initial ART and after initial ART about 6 months) = 0.59 source: Kiertiburanakul, S. et.al, (2007).

N is the number of AIDS patients who received ART under UC in Chiangrai Regional Hospital = 905

From calculating, the samples of this study were 200 cases that included patients in both inpatient department (IPD) and outpatient department (OPD) that comprised of 160 outpatients and 40 inpatients.

3.2.2 Inclusion Criteria

Inclusion criteria on the service provider part were:

1. Provider included physicians, nurses or health care officer in ART service unit and related with ARVs services for HIV/AIDS patients in Chiangrai Regional Hospital.

2. Provider's consent and willing to participate in this study. The purpose of this study had been explained to all participants to allow for data collecting. All participants in this study had signed the consent form.

Inclusion criteria on the patient part were:

1. Adult patients with AIDS who were either male or female who were 18 years old and above (up until eligible date).
2. Adult patients receiving ART, specifically in basic regimen group A as GPO VIR S-30® at least 12 months in Chiangrai Regional Hospital
3. Medical insurance scheme was Universal Health Coverage Scheme (UC) and registered in NAP program.
4. Adult patients never changed ARVs regimen.
5. Adult patients regularly received ART and showed up for appointments.
6. Adult patients' medical records were complete.
7. Adult patients could communication with researcher.
8. Consent and willing to participate in the study. The purpose of study had been explained to all the participants to allow for data collecting. All participants in this study signed the consent document.

3.2.3 Exclusion Criteria

The same exclusion criteria for both provider and patient was that the participants would like to withdraw from the study

3.2.4 Termination criteria

Termination criteria were follows;

1. Participants had severe symptom and were not ready to be interviewed.
2. Participants did not grant the consent to be interviewed.

3.3 Study Site

Province: Chiangrai was selected. The reasons for study at Chiangrai province were the following:

1. High prevalence of cases (second epidemics area in Thailand).

2. Chiangrai province could be the representative of national.

Hospital: Chiangrai Regional Hospital. The reasons for study at Chiangrai Regional Hospital were the following:

1. Chiangrai Regional Hospital was regional hospital which had complete medical supply for service.

2. Chiangrai Regional Hospital started ART service since 2002 and has complete medical record data, so the data could be retrospectively collected.

3. Chiangrai Regional Hospital is the regional hospital in Ministry of Public Health so the result of this study can be expanded to the same level hospitals in Minitry of Public Health.

This research was conducted at HIV clinic and department of medicine in Chiangrai Regional Hospital.

3.4 Research Instruments

Questionnaires and costing record forms had been used in this study. There were three forms as follows:

Form 1 Provider cost record form

Part 1 Labor cost record form

Part 2 Material cost record form

Part 3 Capital cost record form

Part 4 Summary medical care cost record form

Part 5 Summary total cost form

Form 2 Questionnaire for patients recieving ART.

Part 1 Personal data questionnaire

Part 2 Willingness to pay questionnaire

Part 3 ART service receiving data and opputunistic cost questionnaire

Part 4 Relative accompany with patient expenditure questionnaire

Form 3 Medical Record Extraction Form

3.5 Ethical Consideration

The study was performed in accordance with international ethical guidelines, which include the following:

1. This study was approved by the ethical committee on human rights related to human experimentation, Mahidol University on May 21, 2009.

2. This study was approved by the ethical committee of Chiangrai Regional Hospital on September 3, 2009 and got permission from the Director of Chiangrai Regional Hospital.

3. Permission for data collection was made by asking each individual's consent and explaining to them the benefits and the impact of the studies.

4. Personal information in this study such as names and addresses were not recorded and remain confidential and would be presented as overall findings. Codes were used in the data in the record form.

3.6 Data Collection

There were two parts in collecting the cost and benefit data on antiretroviral therapy services at Chiangrai Regional Hospital. They were:

Part 1: Cost collection

The cost collection consisted of three steps as the following:

Step 1 Preparation period

1.1 The Researcher requested for the permission letter for collecting data from the Graduate Office of Mahidol University that was sent to inform the Director of Chiangrai Regional Hospital the purpose of study, the step of process, in order to receive permission document.

1.2 The Researcher proposed document to Ethical Committee of Mahidol University and Chiangrai Regional Hospital.

1.3 The Research tools were tried out then, the tools of research were approved by the advisers and experts in health economics.

Step 2 Implementation period

2.1 The Researcher examined the organization administration and system of Chiangrai Regional Hospital. Then, data collection process and the role of providers on ART service after research protocal had been approved by Ethical Committee of Mahidol University and Chiangrai Regional Hospital.

2.2 The Researcher explained the detail of the study and data collecting to the subjects and sign the consent form.

2.2.1 Collecting the data of Routine Service Cost (RSC) in record form in fiscal year 2008 that showed in detail:

1) The steps in collecting labor cost data:

- The service providers were classified to three groups, i.e. civil servants, permanent employees and temporary employees who helped the Researcher to allocate labor cost.

- ID codes were determined to protect the participants' personal identity.

- Recording labor cost of participants which included salary, wages, overtime wages, position allowance, children allowance, medical expense, tuition fees and rental fee etc. from accounting department in payroll revenue, finance, personnel devision.

- Collecting time directly spent on providing the ART service and collecting sick leave, annual leave and business leave of ART service provider from personnel division (compared with total working time during study period) and observed by the Researcher.

2) Collecting material cost by two material record forms;

- Record form for material list, price, useful life that had been used for ART service in Chiangrai Regional Hospital.

- Record form for public utility cost such as water supply, electricity, postage, telephone from monthly hospital utilities record.

3) Collecting capital cost that performed:

- Record building and equipment price, useful life, proportion of the space/time used for compute the depreciation cost

2.2.2 Data collecting form on medical care cost that showed in detail:

1) The Researcher collected the data from the medical chart and prescription forms that prepared for each outpatient visit and admission. The charges for medication, laboratory test and radiation were based on the fee guildlines of Chiangrai Regional Hospital.

2) Record form for record data of medication and non medical suppies that used in ART service in Chiangrai Regional Hospital.

3) Record form for record data of operative that related in ART service in Chiangrai Regional Hospital.

Patients: Interviewing patients receiving ART had been used to find the external cost.

1) The Researcher cooperated with ART provider for making an appointment with participants who had characteristic in line with inclusion criteria.

2) The purposes of the study and the details of the data collecting had been explained to the participants by the Researcher and the participants signed the consent forms.

3) The ID codes were determined to protect the participants' personal identity.

4) The interview was conducted using the structured questionnaires about 20 minutes.

Part 2 Willingness to pay

Step 1 Preparation period

1.1 Develop the "Willingness to pay" questionnaires.

1.2 Submit the research tools for the approval of the advisers and experts in health economics.

1.3 Try out the research tool with the same characteristics with study population.

1.4 Submit the documents to Ethical Committee (EC) of Mahidol University for approval.

1.5 Coordinate with relevant people in making appointment with participations.

Step 2 Implementation period

After approval of the Ethical Committee (EC) of Mahidol University and Chiangrai Regional Hospital. The Researcher collected data by interview at the private and comfortable place.

The Researcher explained the purpose of the study and the details of data collection to the subjects that they had been interviewed and their personal data would be recorded. If participants agreed to join the project they would be informed to sign the consent form.

Participants sign the consent form voluntarily.

Determine ID code for participants for protect personal identity.

Interview by following the questionnaires about 20 minutes.

3.7 Data Analysis

This study used descriptive and inferential statistics as follow:

1. Descriptive statistics

Percentage, mean, ratio and standard deviation were performed to describe general characteristics of the samples, cost and benefit of antiretroviral therapy.

2. Inferential statistics

The benefit data were analysed by using multiple regression analysis to control for the effect of income on the willingness to pay estimates, a linear or non linear regression analysis can be performed to estimate the relationship between WTP and income.

3. Sensitivity analysis

The aim of a sensitivity analysis is to show the impact on result of varying different parameters. In this sudy, performed with “one-way” analysis, each uncertain component of the evaluation is varied, while the others retain their base-case specifications, in order to establish the separate effect of each component on the results.

CHAPTER IV
RESULTS

The purpose of this study was to analyze cost and benefit of antiretroviral therapy in adult AIDS patients under the Universal Health Coverage in Chiangrai Regional Hospital (CRH). The results of cost, unit cost and benefit in terms of willingness to pay are given in eight parts as follows:

Part 1: Chiangrai Regional Hospital data used in cost benefit analysis

Part 2: Routine service cost

Part 3: Internal cost and external cost

Part 4: Total direct cost of Chiangrai Regional Hospital's antiretroviral therapy service

Part 5: General characteristic of samples

Part 6: Willingness to pay

Part 7: Cost-Benefit Analysis

- 7.1 Benefit-cost ratio
- 7.2 Multiple regression analysis
- 7.3 Validity

Part 8: Sensitivity analysis

Part 1: Chiangrai Regional Hospital data used in cost-benefit analysis

In fiscal year 2008, at the antiretroviral clinic in Chiangrai Regional Hospital, out of the overall number of 642,253 OPD cases, there were 1,741 AIDS patients who had received antiretroviral under Universal Health Coverage. There were 1,268 inpatient days of AIDS patients with ART out of the overall 258,097 inpatient days in Medicine Inpatient Building (Table 4).

Table 4 The basic data used to analyse cost in the fiscal year 2008

Outpatient	**Number**	**Unit**
The number of AIDS patients with ARVs under UC	1,741	cases
The number of outpatient visits that AIDS patients with ARVs under UC receiving service at ART clinic	5,415	times
The overall number of outpatient cases	642,253	cases
Inpatient	**Number**	**Unit**
The inpatient days of AIDS patients with ARVs in Medicine Department	1,268	Inpatient days
The overall inpatient days of inpatient cases	258,097	Inpatient days

Source: The annual report in fiscal year 2008 of Chiangrai Regional Hospital

The Chiangrai Regional Hospital (CRH) was a regional hospital in Chiangrai province. There were 2,182 staffs including 1) 987 civil servant staffs (106 physicians, 12 dentists, 32 pharmacists, 587 registered nurses, 61 technical nurses, 189 other officers); 2) 263 permanent employees; 3) 927 temporary employees; and 4) 5 officers.

Table 5 The number of staffs in the fiscal year 2008

Position	**Number**	**Number of officers involving ART**
Civil servant:		
Physician	106	23
Dentist	12	0
Pharmacist	32	1
Registered nurse	587	78
Technical nurse	61	3
other officer	189	65
Permanent employee	263	77
Temporary employee	927	155
Civil officer	5	0
Total	**2,182**	**402**

The number of health personnel involving ART service was 402 staffs including 1) 170 civil service staffs; (23 physicians, 1 pharmacist, 78 registered nurses, 3 technical nurses, 65 other officers); 2) 77 permanent employees and 3) 155 temporary employees (Table 5).

In the analysis of capital cost, the building data such as construction costs, useful life and sizes of the space of each department, were used to calculate the depreciation. At CRH there were 10 buildings that were involved in ART services. Out of these 10 buildings, four, which were less than 20 years were Chalermprakiet Building, Nutrition Building, Pharmaceutical Building and Medical Supply Building. The construction costs of these four buildings were used to calculate the depreciation as shown in Table 6.

Table 6 The buildings involved in antiretroviral therapy service

No.	Building	Cost of construction (Baht)	No. of Years in service	Area (sq.m.)
1	Diagnostic and Care Building	30,980,000	20.34	9,000
2	Radiation Building	7,394,800	35.36	2,224
3	Male Medicine department Building	3,855,000	27.35	885
4	Chalermprakiet Building (Female Medicine Department)	38,000,000	12.34	4,000
5	Nutrition Building	40,482,000	11.34	4,266
6	Administration Building	5,200,000	31.35	3,360
7	Surgery Building (Laboratory)	15,528,575	25.35	3,884
8	Pharmaceutical Building	15,734,000	15.34	1,350
9	Central Supply Sterile Building	806,400	33.36	288
10	Supply Building	12,910,000	2.33	2,000

Part 2: Routine service cost

Routine service cost of antiretroviral therapy consisted of three parts: Labor cost; operating cost that consisted of material cost and public utility cost; and capital cost. The capital cost of antiretroviral therapy comprised of the depreciation of equipment and the depreciation of building which involved in ART services. In fiscal year 2008, the capital cost was derived from the straight-line depreciation method. The useful life of the equipment was 5 years and that of the buildings was 20 years. The capital cost of outpatient was 7,325.72 Baht, of which the calculated depreciation of equipment was 5,863.18 Baht (80.04 %) and that of the building was 1,462.54 Baht (19.96 %). The capital cost of inpatient was 17,096.14 Baht, of which the depreciation of equipment was 10,440.85 Baht (61.07 %) and that of the building was 6,655.29 Baht (38.93 %). The total capital cost was 24,421.86 Baht (Table 7).

Table 7 Capital cost in the fiscal year 2008

List of capital cost	Outpatient Baht (%)	Inpatient Baht (%)	Total Baht (%)
The depreciation of equipment	5,863.18 (80.04)	10,440.85 (61.07)	16,304.03 (66.81)
The depreciation of buildings	1,462.54 (19.96)	6,655.29 (38.93)	8,117.84 (33.19)
Total capital cost	**7,325.72 (100.00)**	**17,096.14 (100.00)**	**24,421.86 (100.00)**

Routine Service Cost (RSC) of antiretroviral therapy services consisted of three parts: labor cost, capital cost and operating cost, which consisted of material cost and public utility cost (Table 8). The total routine service cost of ART outpatient case was 1,755,402.97 Baht, of which the highest of cost was labor cost 87.50%, 8.90% was material cost and 3.18% was public utility cost. The total RSC of ART inpatient case was 2,367,261.68 Baht, the largest was labor cost at 86.75%, 9.23% was material and 3.29% was public utility cost. In other words, the total RSC of ART inpatient was more than 1.35 times that of outpatient or 611,858.71 Baht. The total of

RSC was 4,122,644.65 Baht, of which the highest cost labor at 87.07%, 9.09% was material and 3.24% was public utility cost.

Table 8 Labor cost and Operating cost in the fiscal year 2008

List of cost	Outpatient Baht (%)	Inpatient Baht (%)	Total Baht (%)
Labor cost	1,536,007.52 (87.50)	2,053,590.97 (86.75)	3,589,598.49 (87.07)
Material cost	156,312.97 (8.90)	218,600.04 (9.23)	374,913.01 (9.09)
Public utility cost	55,756.76 (3.18)	77,974.53 (3.29)	133,731.29 (3.24)
Capital cost	7,325.72 (0.42)	17,096.14 (0.72)	24,421.86 (0.59)
Total RSC cost	**1,755,402.97 (100%)**	**2,367,261.68 (100%)**	**4,122,664.65 (100%)**

Part 3: Internal cost and external cost

In Table 9, in the medical care cost of antiretroviral therapy in outpatient, it was found that the biggest portion was laboratory cost (73.75%), followed by medication and medical supply cost (24%). The cost of ARVs was not included in medical care cost because of GPO VIR S-30® was included in benefit package of UC that was supported by National Health Security Office (NHSO). In the segment of the medical care cost of ART in inpatient, it was found that the biggest portion was medication (37.08%), followed by laboratory and radiation cost, which were 29.47% and 22.28% respectively. The total medical care cost of ART was 4,715,405 Baht. The costs of laboratory, medication, medical imaging and others were 64.30%, 26.79%, 5.63% and 3.28% respectively.

Table 9 Medical care cost of ART services in the fiscal year 2008

List of medical care cost	Outpatient Baht (%)	Inpatient Baht (%)	Total Baht (%)
Medication cost	890,279.10 (24.00)	373,025.60 (37.08)	1,263,304.70 (26.79)
Laboratory cost	2,735,656.69 (73.75)	296,502.72 (29.47)	3,032,159.41 (64.30)
Radiology cost	41,235.29 (1.11)	224,115.92 (22.28)	265,351.21 (5.63)
Other cost	42,235.03 (1.14)	112,354.65 (11.17)	154,589.68 (3.28)
Total MCC	**3,709,406.11 (100)**	**1,005,998.88 (100)**	**4,715,405.00 (100)**

Regarding the internal cost of antiretroviral therapy both of outpatient and inpatient in the fiscal year 2008 (Table 10), it was found that the total internal cost of outpatient was 5,464,809.08 Baht. For inpatient, it was 3,373,260.57 Baht. We could conclude that the internal cost of outpatient was 1.62 times of, or 2,091,548.51 Baht, more than that of the inpatient. The biggest proportion of indirect cost in outpatient was medical care at 67.88 % and 28.11 % was labor cost. That of inpatient was labor at 60.88 %and 29.82 % was medical care cost. The total internal cost of ART in fiscal year 2008 was 8,838,069.65 Baht.

Table 10 The internal cost of ART service in the fiscal year 2008

List of internal cost	Outpatient Baht (%)	Inpatient Baht (%)	Total Baht (%)
Medical care cost	3,709,406.11	1,005,998.88	4,715,405.00
	(67.88)	(29.82)	(53.35)
Routine service cost			
Labor cost	1,536,007.52	2,053,590.97	3,589,598.49
	(28.11)	(60.88)	(40.62)
Operating cost	212,069.73	296,574.57	508,644.30
	(3.88)	(8.79)	(5.76)
Capital cost	7,325.72	17,096.14	24,421.86
	(0.13)	(0.51)	(0.28)
Total	**5,464,809.08**	**3,373,260.57**	**8,838,069.65**
	(100)	**(100)**	**(100)**

The external cost comprised of direct medical cost and direct non-medical cost. This study focused on the cost of antiretroviral therapy under UC that did not have the cost of direct medical cost as the patient received free of charge health services under UC. As for the direct non-medical cost such as travelling cost, food cost, accommocation cost and opportunity cost (Table 11), it was found that the external cost per outpatient visit comprised of travelling cost, opportunity cost and food cost that amounted to 169.27 Baht (45.54%), 166.98 Baht (44.93%) and 34.72 Baht (9.34%) respectively. The external cost per inpatient day comprised of opportunity cost, food cost, and travelling cost that came to 232.18 Baht (57.07%), 87.72 Baht (21.56%) and 86.96 Baht (21.34%) respectively.

Table 11 The external cost of outpatient and inpatient of ART services in the fiscal year 2008

Type of external cost	**Cost per OPD visit Baht (%)**			**Cost per inpatient day Baht (%)**		
	Patient	**Relative**	**Total**	**Patient**	**Relative**	**Total**
Travelling cost	158.55	10.72	169.27 (45.54)	23.44	63.52	86.96 (21.37)
Food cost	31.25	3.47	34.72 (9.34)	0.39	87.33	87.72 (21.56)
Accommodation cost	0.7	0	0.7 (0.19)	0	0	0
Opportunity cost	151.20	15.78	166.98 (44.93)	136.55	95.63	232.18 (57.07)
Total external cost	**341.70**	**29.97**	**371.61 (100)**	**160.38**	**246.48**	**406.86 (100)**

In summary, the total external cost was 371.61 Baht per outpatient visit, of which the majority came from the patient at 341.70 Baht. The external cost per inpatient day comprised of opportunity cost, food cost, and travelling cost, that were 232.18 Baht (57.07%), 87.72 Baht (21.56%) and 86.96 Baht (21.37%) respectively. In

summary, the total external cost was 232.18 Baht per inpatient day, of which the majority was from relative at 246.48 Baht and the total external cost was 406.86 Baht per inpatient day.

Part 4: Total direct cost of antiretroviral therapy service in Chiangrai Regional Hospital

The total cost of antiretroviral therapy service in CRH both internal and external costs are shown in Table 12. The total cost comprised of internal cost that means provider's cost and external cost which is patient cost. The total cost of outpatient was 7,477,402.13 Baht, which included the internal cost of 5,464,809.08 (73.08%) and the external cost of 2,012,593.05 Baht (26.92%). The internal cost is 2.72 times of or 3452216.03 Baht more than the external cost.

Table 12 Total cost of antiretroviral therapy services in the fiscal year 2008

Cost classification	Outpatient Baht (%)	Inpatient Baht (%)	Total Baht (%)
Internal cost			
Medical care cost	3,709,406.11 (49.61)	1,005,998.88 (25.87)	4,715,405.0 0 (41.48)
Routine service cost			
Operating cost	212,069.73 (2.84)	296,574.57 (7.63)	508,644.30 (4.47)
Labor cost	1,536,007.52 (20.54)	2,053,590.97 (52.80)	3,589,598.49 (31.58)
Capital cost	7,325.72 (0.10)	17,096.14 (0.44)	24,421.86 (0.22)
Total RSC	1,755,402.97 (23.48)	2,367,261.68 (60.87)	4,122,664.65 (36.27)
Total internal cost	**5,464,809.08 (73.08)**	**3,373,260.57 (86.73)**	**8,838,069.65 (77.76)**

Table 12 Total cost of antiretroviral therapy service in the fiscal year 2008 (Cont.)

Cost classification	Outpatient Baht (%)	Inpatient Baht (%)	Total Baht (%)
External cost			
Direct medical cost	0	0	0
Direct non medical cost	2,012,593.05 (26.92)	515,898.48 (13.27)	2,528,491.53 (22.24)
Total external cost	**2,012,593.05 (26.92)**	**515,898.48 (13.27)**	**2,528,491.53 (22.24)**
Total cost	**7,477,402.13 (100)**	**3,889,159.05 (100)**	**11,366,561.18 (100)**

The total cost of inpatient was 3,889,159.05 Baht, which included the internal cost of 3373260.57 (86.73%) and the external cost of 515,898.48 Baht (13.27%). Thus, the internal cost was 6.34 times of or 2857362.09 Baht more than the external cost. The total cost of outpatient was 7,477,402.13 Baht and inpatient was 3,889,159.05 Baht, so the outpatient cost is 1.92 times of inpatient cost.

Table 13 Unit cost of antiretroviral therapy services under UC

Unit cost	Internal cost (Baht)	External cost (Baht)	Total (Baht)
Cost per outpatient visit	1,009.20	371.67	1,380.87
Cost per inpatient day	2,660.30	406.86	3,067.16

The unit cost of antiretroviral therapy service was shown in Table 13. he unit cost per patient could be computed by dividing the total cost by number of outpatient visits or number of inpatient days, the cost per outpatient visit was 1,380.87 Baht and the cost per inpatient day was 3,067.16 Baht.

Part 5: General characteristic of samples

Two hundred AIDS patients were considered eligible for enrollment and interview. Of the two hundreds 160 were outpatients and 40 were inpatient cases. The description of sample characteristics was shown in Table 14. Out of total cases constituted, 41.0% were females and 59.0% males. The average age was 40.35 years of which the age of the majority of the interviewed was 30-39 years (45.5%). For the marital status, 50.0% were married and 18.5% were single. The highest education level was elementary school (54.0%). Most of the samples (84.5%) were employed. The highest occupation was wage earner at 42.5% and 24.5% agriculture.

Table 14 Characteristic of samples

Parameter	Outpatient (N= 160)	Inpatient (N= 40)	Total (N= 200)
	Number (%)	Number (%)	Number (%)
Sex			
Female	62 (38.8)	20 (50.0)	82 (41.0)
Male	98 (61.2)	20 (50.0)	118 (59.0)
Age (year) OPD mean=40.43; IPD mean=40.10; all mean=40.35			
18-29	12 (7.5)	3 (7.5)	15 (7.5)
30-39	71 (44.4)	20 (50.0)	91 (45.5)
40-49	57 (35.6)	13 (32.5)	70 (35.0)
50-59	16 (10.0)	3 (7.5)	19 (9.5)
>60	4 (2.5)	1 (2.5)	5 (2.5)
Marital status			
Single	31 (19.4)	6 (15.0)	37 (18.5)
Married	79 (49.4)	21 (52.5)	100 (50.0)
Divorced	26 (16.3)	8 (20.0)	34 (14.5)
Widowed	24 (15.0)	5 (12.5)	29 (14.5)

Table 14 Characteristic of samples (Cont.)

Parameter	Outpatient (N= 160)	Inpatient (N= 40)	Total (N= 200)
	Number (%)	Number (%)	Number (%)
Highest education level			
Not education	29 (18.1)	11 (27.5)	40 (20.0)
Elementary school	91 (56.9)	17 (42.5)	108 (54.0)
Secondary school	20 (12.5)	5 (12.5)	25 (12.5)
Trade/Technical college	16 (10.0)	4 (10.0)	20 (10.0)
University degree	4 (2.5)	3 (7.5)	7 (3.5)
Occupation			
Unemployed	21 (13.1)	10 (25.0)	31 (15.5)
Private employee	71 (44.4)	14 (35.0)	85 (42.5)
Business Owner	2 (1.3)	2 (5.0)	4 (2.0)
Agriculture	44 (27.5)	5 (12.5)	49 (24.5)
Merchant	9 (5.6)	3 (7.5)	12 (6.0)
Enterprise employee	3 (1.9)	2 (5.0)	5 (2.5)
Security Guard	4 (2.5)	0	4 (2.0)
Housewife	4 (2.5)	2 (5.0)	6 (3.0)
Beutician	2 (1.3)	2 (5.0)	4 (2.0)

If we compare the average age of outpatient and inpatient, the average age of outpatients was 40.43 years and that of the inpatients was 40.10 years. For both types of patients, the largest group were between 30 to 39 years of age. Amongst outpatients and inpatients 49.4% and 52.5% respectively were married. The highest education level was 56.9% for outpatient and 42.5% for inpatient. 18.1% of outpatients and 42.5% of inpatients had no education. The occupation of outpatient samples could be viewed in this manner: private employee (44.4%), agriculture (27.5%) and unemployed (13.1%). Those of inpatients were in this manner: private employee (35.0%), unemployed (35.0%) and agriculture (12.5%). The reason that the patients were unemployed was because they were ill and could not get a job.

In health status of samples was shown in Table 15. The mean of duration on ARVs in outpatients was 3.34 years (min=0.35, max=7.34) and 3.43 year (min= 0.56, max=6.67) for inpatients. The mean CD4 level before starting receiving ARVs of outpatient samples was 88.86 cells/cu.mm (min=1, max=415), and after 6 months, CD4 level was 232.23 cells/cu.mm (min=32, max=794), which means that CD4 level increased by 143.37 cells/cu.mm on average.

Table 15 Health status of samples

Variable	Outpatient (N=160)				Inpatient (N=40)			
	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.
Duration on ARV(year)	0.35	7.34	3.34	1.76	0.56	6.67	3.43	1.70
CD4 start (cells/cu.mm)	1	415	88.86	73.23	2	351	80.43	79.03
CD4 at 6 mo. (cells/cu.mm)	32	794	232.23	134.94	1	747	202.70	140.28
Status of health (score)	40	100	82.51	14.88	40	100	77.83	15.78
Adherence VAS (score)	50	100	92.51	8.68	50	100	92.21	9.10

As for the inpatients samples, the mean CD4 level before starting receiving ARVs was 80.43 cells/cu.mm (min=2, max=351), and after 6 months, CD4 level was 202.70 cells/cu.mm (min=1, max=747) which means that CD4 level increased by 122.27 cells/cu.mm on average.

On the status of health when doing self-assessment by Visual Analog Scale, it was found that the score of health status of outpatients was 82.51 and that of the inpatients was 77.83. Therefore the outpatients' score was 4.63 points more than inpatients'. When interviewing the patients on the adherence on ARVs using self-assessment method by Visual Analog Scale, it was found that the score of outpatients was 92.51 and that of the inpatients was 92.21. In other words the score of the outpatients was very much the same as the inpatients'.

Table 16 shows the socio-economics status of the samples. The average monthly income of outpatients was 3,250.31 Baht and that of the inpatients was 3,177.50 Baht. The largest group of both types of patients had monthly income interval from 1- 1,999 Baht, which were 30.5% of total samples.

Table 16 Socioeconomic of the samples

Variable	Outpatient (N=160)	Inpatient (N=40)	Total (N=200)
	Number (%)	**Number (%)**	**Number (%)**
Monthly income (Baht) OPD mean=3,250.31; IPD mean= 3,177.50			
No income	9 (5.6)	5(12.5)	4(7.0)
1-1,999	50 (31.3)	11 (27.5)	61 (30.5)
2,000-3,999	46 (28.8)	9 (22.5)	55 (27.5)
4,000-5,999	35 (21.9)	7 (17.5)	42 (21.0)
6,000-7,999	6 (3.8)	3 (7.5)	9 (4.5)
8,000-9,999	4 (2.5)	3 (7.5)	7 (3.5)
≥10,000	10 (6.3)	2 (5.0)	12 (6.0)
Character of residence			
Single house	147 (91.9)	33 (82.5)	180 (90.0)
Town house	1 (0.6)	0	1 (0.5)
Apartment	1 (0.6)	1 (2.5)	2 (1.0)
Rent room	8 (5.0)	5 (12.5)	13 (6.5)
Commercial building	1 (0.6)	1 (2.5)	2 (1.0)
Others	2 (1.3)	0	2 (1.0)
Ownership			
Own	72 (45.0)	15 (37.5)	87 (43.5)
Rent	10 (6.3)	7 (17.5)	17 (8.5)
Without payment	77 (48.1)	17 (42.5)	94 (47.0)
Other	1 (0.6)	1 (2.5)	2 (1.0)

On the character of residence, majority was single houses with 91.9% and 82.5% of the outpatients and inpatients living in single houses respectively. Most of samples resided in the residence without paying rent because they were residence of their relatives. There were ten outpatient samples, who lived in the rented residence. The average rental fee was 2,010 Baht per month and seven inpatient samples paid rental fee 1,671.43 Baht per month.

The samples of this study were AIDS patients who had received antiretroviral therapy. The opportunistic infection might exist both pre- and post-antiretroviral therapy so from the result of the review of the medical record it was found that 68.1% of outpatient samples were ever infected with opportunistic diseases during pre-ART. After having ART the opportunistic infection declined to 20.6%. That means the opportunistic infection decreased by 47.5%. For inpatient samples, the existing of OIs during pre-ART was 77.5% and 65% during post-ART. The opportunistic infection that mostly occurred both pre-ART and post-ART was tuberculosis infection (Table 17).

Table 17 Experience of occurring OIs, adverse drug reaction and drug resistance

Variable	Outpatient (N=160)	Inpatient (N=40)	Total (N=200)
	Number (%)	Number (%)	Number (%)
Opportunistic infection			
Before ARVs			
Never	51 (31.9)	9 (22.5)	60 (30.0)
Ever	109 (68.1)	31 (77.5)	140 (70.0)
After ARVs			
Never	127 (79.4)	14 (35.0)	141 (70.5)
Ever	33 (20.6)	26 (65.0)	59 (29.5)
Adverse drug reaction			
Never	139 (86.9)	33 (82.5)	172 (86.0)
Lipodystrophy	6 (3.8)	0	6 (3.0)
Peripheral neuropathy	6 (3.8)	1 (2.5)	7 (3.5)
Other	9 (5.6)	6 (15.0)	15 (7.5)
Drug resistance			
Never	159 (99.4)	40 (100.0)	199 (99.5)
Ever	1 (0.6)	0	1 (0.5)

The antiretroviral drugs could create adverse drug side effect reaction. In this study, in most of the samples adverse drug reaction (86% of the total samples) was not found. Only one sample was drug resistance.

The survey about the awareness of the importance of ART service was to find out about the attitude of samples. 95.5% of total samples were highly aware. The awareness about importance of adherence in ARVs was 98.0% of the total samples. As for the satisfaction of receiving ART, 77.5% were highly satisfied.

Table 18 Attitude and understanding of samples

Variable	Outpatient (N=160)	Inpatient (N=40)	Total (N=160)
	Number (%)	Number (%)	Number (%)
Attitude			
1. Do you concern about importance of antiretroviral therapy service?			
Highest	151 (94.4)	40 (100)	191 (95.5)
High	9 (5.6)	0	9 (4.5)
Moderate	0	0	0
2. Do you concern about impotance of adherence in ART?			
Highest	156 (97.5)	40 (100)	196 (98.0)
High	4 (2.5)	0	4 (2.0)
Moderate	0	0	0
3. Are you stratified with the overall of antiretrovital therapy service?			
Highest	124 (77.5)	31 (77.5)	155 (77.5)
High	29 (18.1)	6 (15.0)	35 (17.5)
Moderate	7 (4.4)	3 (7.5)	10 (5.0)

Table 18 Attitude and understanding of samples (Cont.)

Variable	Outpatient (N=160)	Inpatient (N=40)	Total (N=160)
	Number (%)	Number (%)	Number (%)
Understanding (score)			
6	90 (56.3)	24 (60.0)	114 (57.0)
5	50 (31.3)	11 (27.5)	61 (30.5)
4	16 (10.0)	4 (10.0)	20 (10.0)
3	1 (0.6)	1 (2.5)	2 (1.0)
2	1 (0.6)	0	1 (0.5)
1	1 (0.6)	0	1 (0.5)
0	1 (0.6)	0	1 (0.5)

In questionnaires on the understanding of AIDS test, of which the highest score was 6. The interview result showed that 56.3% of outpatient and 60.0% of inpatient samples got full marks and only one inpatient sample did not get any score.

Part 6: Willingness to pay

In the benefit evaluation by assessing the willingness to pay of antiretroviral therapy under UC using contingent valuation method, the samples were asked what was the highest amount of money they were willing to pay in order to maintain receiving the ART service, assuming a hypothetical situation that UC would not cover ART. From interviews, the results are shown in Table 19.

Table 19 Average of willingness to pay

Variable	Outpatient (N=160)				Inpatient (N=40)			
	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.
Willingness to pay	20	5,000	426.06	610.20	30	3000	874.50	806.44

The willingness to pay of outpatient on an average 426.06 Baht per outpatient visit (min=20, max=5,000). The average of WTP of inpatient was 874.50 Baht per admit (min=30, max=3,000).

Part 7: Cost-Benefit Analysis

This study used the decision making techniques that was benefit-cost ratio by using Gross Benefit-Cost Ratio (BCR) formula.The results were classified to three parts as follows:

7.1 Benefit-cost ratio

The cost-benefit analysis of antiretroviral therapy service under universal heatlh coverage was done by gross benefit-cost ratio. The benefit was consisted of amount the patients were willing to pay, and the cost was the cost of AIDS patient who did not receive ARVs. The study of Tsutomu Kitajima and others (Kitajima, et al., 2003) in cost of medical services for patients with HIV/AIDS in Khon Kaen found that cost per outpatient visit on HIV/AIDS was 6,905.18 Baht, and cost per inpatient day was 11,588.01 Baht.

Table 20 Benefit- cost ratio of antiretroviral therapy

Department	WTP (A)	Cost Averted (B)*	Benefit (A+B)	Unit cost (C)	Benefit – cost ratio ((A+B)/C)
Outpatient	426.06	6,905.18	7,331.24	1,380.87**	5.31
Inpatient	874.50	11,588.01	12,462.51	3,067.16***	4.06

* **Source:** Kitajima, T. et al (2003). In the study the data were costs of medical services for patients with HIV/AIDS in Khon Kaen.

** Cost per outpatient visit

*** Cost per inpatient day

Table 20 shows that the gross benefit-cost ratio of outpatient was 5.31 and gross benefit-cost ratio of inpatient was 4.06 which would accept the project when Benefit per cost value was more than 1.

Thomas E. Getzen (2007) explained that the goal of using cost-benefit analysis was to help deciding when the benefit (B) was greater than costs (C), or B > C. The job of analyst was to come up with the best estimate and to suggest the alternatives. An option is chosen if:

(Probability of Gain) x (Benefits) > (Probability of Loss) x (Cost)

This formula separates the uncertainties (Probability of gain/loss) and the values (benefit/cost) that are involved in the decision-making process. The result of this study was as follows:

Pt OPD = 7,331.24 Baht
(Probability of Gain = 1- (7,331.24/19,793.75)
= 0.63

Benefit (Gain)
(mean)

Pt IPD = 12,462.51 Baht
(Probability of Gain = 1- (12,462.51/19,793.75)
= 0.37

Pt OPD = 1,380.87 Baht
(Probability of Loss = 1- 0.63 = 0.37)

Cost (Loss)

Pt IPD = 3,067.16 Baht
(Probability of Loss = 1- 0.37 = 0.63)

OPD	(Probability of Gain x Benefit)		(Probability of Loss x Cost)
	(0.63 x 7,331.24)		(0.37 x 1,380.87)
	4,618.68	>	510.92

IPD	(Probability of Gain x Benefit)		(Probability of Loss x Cost)	
	(0.37 x 12,462.51)		(0.63 x 3,067.16)	
	4,611.13	>	1,932.31	

Comparison between benefit and cost of antiretroviral therapy results showed that the benefits (B) are greater than costs (C), both for outpatient and inpatient. This is why the project is chosen to implement.

7.2 Multiple Regression Analysis

To control the effect of income on the WTP estimates, a linear or nonlinear regression analysis was performed to estimate the relationship between WTP and income in the surveyed population. If the relationship was linear, any desired income value could be chosen to represent the population of interest and the mean WTP at that income level was estimated from the regression equation (Bala M. V., et al., 1999). So WTP and income were analysed by stepwise technique of multiple regression analysis, the result is shown in Table 21:

Table 21 Multiple regression analysis

TYPE	Constant	Unstandardized Coefficients B	Standardized Coefficients Beta	T	Sig.
OPD	(Constant)	-168.660		-.420	.675
	Income	.121	.608	9.322	.000
	Health status	-6.515	-.159	-2.495	.014
	Health before illness	155.465	.146	2.237	.027
IPD	(Constant)	326.698		2.222	.032
	Income	.172	.635	5.070	.000

B is the regression coefficient

Beta is the standardized regression coefficients

t and Sig. is the statistics testing was if t-test has sig. > 0.05, do not use B into equation because of β_0 =0

The result of multiple regression in Table 21 was shown in linear regression equation:

Outpatient

WTP = 0.121 income – 6.515 heatlh status + 155.465 Health before illness

Inpatient

WTP = 0.172 income

7.3 Validity

The willingness to pay needs validity assessment in terms of internal consistency. The amounts the samples in this study were willing to pay for antiretroviral therapy, actually did not exceed their entire income. For face validity, the tool of research was approved by the advisers and experts in health economist so the questionnaire in this study was reasonable and plausible.

Part 8: Sensitivity analysis

The aim of a sensitivity analysis is to show the impact on result of varying parameters. This study performed with one-way analysis, each uncertain component of the evaluation is varied, the sensitivity analysis of this study is shown in Table 22.

Table 22 Sensitivity analysis

Uncertainties examined	Cost (Baht)	% change
Baseline cost	11,366,561.18	0%
Capital cost = 0	11,342,139.32	decreased 0.21 %
Add GPO VIR S-30® price	22,142,691.79	increased 94.81 %
Viral load 2 times a year	13,071,696.17	increased 15.00%

CHAPTER V
DISCUSSION

This study was the cost-benefit analysis of antiretroviral therapy under Universal Health Coverage in Chiangrai Regional Hospital. We analysed costs and benefits and the result of the study was described in previous chapter, especially after computing cost from the perspective of provider and patient in the 2008 fiscal year. The benefit was measured in terms of willingness to pay method by contingent valuation method that result could be discussed in four parts as follows:

Part 1 Cost of antiretroviral therapy

Part 2 Benefit as willingness to pay

Part 3 Cost-benefit analysis

Part 4 The strength and weakness of this study

Part 1: Cost of antiretroviral therapy

The total patients who had received antiretroviral therapy under Universal Health Coverage in Chiangrai Regional Hospital in the 2008 fiscal year were 1,741. If compare with other general hospital, it was responsible for a lot of patients because of Chiangrai province was second only to Bangkok in terms of the number of people living with HIV. Thus it was necessary to have a cost and benefit evaluation regarding antiretroviral therapy in both outpatient and inpatient.

This study had analysed the perspective of provider and patientboth. The result found that medical care cost was the highest in the total provider cost (49.61%). Within this amount, there was 73.75 % for laboratory cost and 24.0% for medication cost.Thus, this study did not includ cost of antiretroviral drugs. But if include, the total cost would increase from 11,366,561.18 Baht to 22,142,691.79 Baht, an increase of 94.81%. If Government Pharmaceutical Organization could produce antiretroviral drugs in cheaper price, overall cost of antiretroviral therapy in Thailand would

extremely decline. Futher, ARVs had to be dispensed in amount of ARVs drugs according to follow up month and in actuality, it become taking too much. The remaining ARVs might be used for people living with AIDS that did not access to ART service affect because of increasing ARVs resistance later. Furthernore, patient going from ARVs to health care officer, the efficacy of ARVs should be considerd, including expiry date. The cost would decrease substantially provided that health care officer dispense an amount of ARVs according to actual taking and leave enough for follow up dates. However, it was a sensitive issue for patient.This also might be occurred because of insufficient ARVs. Therefore, they should have issued practice guideline later. The comparison between outpatient and inpatient cost found that outpatient cost was 1.92 more than inpatient cost. the This result is also supported in Jururungsipong, R. & Bumrungyot W. (2006) where it was found that ART affected to higher level of CD4 in HIV infected/AIDS patient. This reduces the treatment cost for opportunistic infection disease and decrease hospitalization. This study did not include the cost of ARVs to conpute medication cost because GPO VIR S-30® was includeded in benefit package of UC that was supported by National Health Security Office (NHSO). In case we include the cost of ARVs, it would occur that outpatient cost affects more than inpatient cost, because ARVs used in inpatient was ARVs that was already received from outpatient department. Inpatient had the ability to take ARVs by themselves in order to have adherence for ARVs. The offered way to decrease inpatient cost was more emphatic about adherence in ARVs.

From the result of external cost of outpatient, it was found that the most of the proportion was travelling cost. The average cost per outpatient visit was 169.27 Baht and opportunity cost was 166.98 Baht per outpatient visit. The expense of relative was less than patient because of the number of outpatient visit was 497 in 6 months. Relatives accompanying with patient was only 48 visits (9.67%), because of the fact that the patient receiving ART are healthier and they could travel by themselves. In case the patient was accompanied by their relative, it was mainly the elderly patient, unhealthiness, blind and foreigner who could not speak Thai language. The result of external cost of inpatient found that the most proportion was opportunity cost that average cost per inpatient day was 232.18 Baht and food cost was 87.72 Baht per inpatient day. If we compare with the former study of Kongsin, S. et al. (1993)

regarding the hospital care cost analysis of patients with AIDS, it was found that average of external cost per case was 1,154 Baht per year. In summary, the internal cost was 8,838,069.65 Baht (77.76%) and the external cost was 2,528,491.53 Baht (22.24%). The unit cost of antiretroviral therapy (computing from total cost divided with outpatient visit or inpatient day) in the case of cost per outpatient visit was 1,380.87 Baht, and the cost per inpatient day was 3,067.16 Baht.

We compared with the study of Kitajima, T., et al (2003) in hospital care cost of patients with HIV/AIDS in Khon Kaen, especially both outpatient and inpatient services of Khon Kaen Regiona Hospital and Northeast Regional Infectious Hospital. The study found that the average cost per outpatient visit with antiretroviral drugs when was already discounted 77,835.43 Baht per outpatient visit that was more than 56.37 times in this study. For inpatient with ARVs was 97,386.88 Baht per inpatient day that was more than 49.70 times in this study. This extreme difference between the previous and the present study regarding the use of original antiretroviral drugs is because of the fact that using GPO VIR S-30® produced from Government Pharmaceutical Oraganization made ARVs price cheaper than before.

Part 2 Benefit as willingness to pay

Chiangrai province was second only to Bangkok in the number of people living with HIV, so if compared with other general hospital, CRH was responsible for a lot of patients. The samples of this study was AIDS patients who recieived GPO VIR S-30® under Universal Health Coverage Scheme (UC) in Chiangrai Regional Hospital that comprised of 160 outpatient and 40 inpatient. The interviews regarding the willingness to pay found that WTP question was complex, difficult to understand, spent a lot of time to explain might because 20% of patient did not have education. In addition to WTP questions do not ask daily life and difficult to refer from experience according to the study of Suksirisereekul, S. (2008).

Bias in contingent valuation method makes us systematically deviate from individual true valuation. Bias occurring in this study was sampling bias. The review of literature of Bayoumi, 2004 shows that sampling bias is when even when

respondents chose to answer does not make a survey representative of the population being studied.It is such as convenience samples, used in the study. The method to minimize sampling bias is to use population based sampling when feasible. The sample was selected from patient who received ART service at antiretroviral clinic and department of medicine. The researcher waited to interview after patient received complete service. To avoid the editing bias that was the tendency for individuals to revise the information they receive during the CV interview, this study tries to assess respondents' answers and ensure consistency. Due to this study value elicitation technique was open-ended question, so it was not important to concern about starting bid or anchor-point bias that occur in bidding game question. During interview we have some patient who answered that they would not pay any money for ART. This occurred as the protest zero bias. To minimize bias also allowed respondents to not to answer a question and recorded responses as missing, rather than zero. According to Ninan, K.N., (2008), the interviewer was the one in any factor that was likely to influence willingness to pay, thus interviewer had to be well trained to reduce bias. Moreover, the trial to interview was tested with patient 30 cases in Petchabun hospital and thereafter, the researcher improved questionnaire to understand easier.There was only one interviewer in this study, we so do not have interviewer bias.

Validity of this study or to assess whether answers were given accurately reflect what respondents would be willing to pay in a market truly existed. For internally consistent exist in this study because the amount individuals are willing to pay for ART service should not exceed their entire income. As for face validity, the tool of research was approved by the advisers and experts in health economist so that the questionnaire in this study becomes reasonable and plausible.

Interview to measured willingness to pay is by contingent valuation technique. The hypothetical situation of this study was that "if in the future, the government could not undertake ART service under Universal Health Coverage, would the affected patient pay still for received service. The amount of money that you are willing to pay will be by cash within a day, for still received service? Considering the income - saving or enable money -, we had three questions as follows:

1. "What is the maximum money do you willing to pay for receiving antiretroviral therapy per visit?"

2. “What is the maximum money do you willing to pay for healthier and CD4 increasing?”

3. “What is the maximum money do you willing to pay to sustain CD4 stability from increasing formerly?”

According to Bayoumi, A.M. (2004), the three questions above mention on reliability that refers to the consistency of a measure upon repeated evaluation. When situation of patient has remained unchanged (such as when tests are repeated over a short-time interval), a reproducible measure will yield consistent results. The result from interview found that the patient’s answers were not different.

Part 3 Cost-benefit analysis

The cost-benefit analysis of antiretroviral therapy service under universal heatlh coverage is by gross benefit-cost ratio. For benefit, it consists of willingness to pay and cost averted by computing gross benefit-cost ratio of outpatient which was 5.31 and gross benefit-cost ratio of inpatient was 4.06 which would accept the project when benefit per cost value more than 1. According to the study of Kulsomboon, V. et al. (2546) in benefit evaluation with human capital approach was measured in terms of productivity from morbidity and mortality prevention. For estimation of benefit-cost ratio compared between with and without antiretroviral therapy or GPO VIR S-30®. The result found that incremental benefit-cost ratio was 2.68 to 2.94 which rendered it the most efficient.

If only WTP was considered as benefit in study, benefit-cost ratio of outpatient was 0.31 and inpatient was 0.29. The first possible reason was that the WTP valuation related to average income of patient receiveing ART in outpatient was 3,250 Baht, inpatient was 3,177.50 Baht. The most proportion of monthly income interval both of outpatient and inpatient was 1- 1,999 Baht, so there are 31.3% of total samples. According to the poverty line of Thailand 1,443 Baht per month (Office of the National Economic and Social Development Board, 2008). It was found that samples average monthly income less than poverty line was 25% of total samples. Some patients, who were; already approved and diagnosed by physician and but having poverty status or abandoned or unable to earn a living, were receiving benefits

for support life from the Local administrative amount of 500 Baht per month (Office of the National Economic and Social Development Board, 2008). This benefit added to the income of patient. The second possible reason was that the under the antiretroviral therapy in UC, the patient could receive ART service free of charge. There was less awareness of worth of antiretroviral therapy in the same way and the willingness to pay was less valued as well.

Part 4 The strength and weakness of this study

The strengths of the study were as follows:

1. This study received good cooperation with administrators, staffs and patient who had received antiretroviral therapy in Chiangrai Regional Hospital for giving datas, interviews and for coordination.
2. This study was the benefit measuring of ART in terms of willingness to pay method by contingent valuation method. This had never been studied before.
3. The researcher improved questionnaire to understand easier. There was also only one interviewer in this study, so we have no interviewer bias.

The weaknesses of the study were as follows:

1. This study was the cost-benefit analysis that did not have an alternative to evaluation and did not analyse decision tree clearly.
2. The collectiong data of medication cost could not retrieved from database of CRH so the researcher collected data follow with medical record of each patient that spend more time.
3. This study did not have comparation of alternative therapy such as other regimens or other conditions, therefore unable to evaluate about its' really worth.

CHAPTER VI
CONCLUSION

This is the cost-benefit analysis of antiretroviral therapy in Chiangrai Regional Hospital, both outpatient and inpatient. The study analysed the provider and patient perspective in 2008 fiscal year. The benefit was valued by willingness to pay (WTP) method that used contingent valuation method in terms of monetary units. The amount was computed for benefit-cost ratio. The conclusions of the study are:

Conclusion of the study

The cost analysis in this study was cost of illness, which calculated on the basis of the prevalence-based approach in fiscal year 2008. There were two compositions that were routine service cost; comprised of labor cost, material cost, public utility cost and capital cost; and medical care cost. The collecting data of RSC cost firstly was sorted out with any department in CRH that involves with ART service. It was then allocated by using proportion of amount of hour that service in outpatient department and equally by per amount of hour that service in inpatient department. For the collection of the data of medical care cost, we used the OPD medical record that was retrospectively collected-one year in medication cost, laboratory cost, radiation cost and other service cost. We also collected the IPD medical chart that was collected in one hospital admission of each patient. The external cost and willingness to pay was collected by interviewing both patient and accompanying relative, at times when they came to receive ART service.

The results of this study were divided into two principle parts i.e. internal cost and external cost. The internal cost consisted of two parts such as RSC and medical care cost. The total of RSC cost was 4,122,644.65 Baht, in which the most proportion of cost was 87.07% for labor cost, 9.09% for material cost, 3.24% for public utility cost and 0.59% for capital cost. In addition, the total medical care cost of

ART was 4,715,405 Baht out of which the highest proportion was medication cost (26.79%), beside laboratory cost and radiation costs were 64.30% and 5.63%, respectively.

The external cost per outpatient visit comprised of travelling cost, opportunity cost and food cost that amounted 169.27 Baht (45.54%), 166.98 Baht (44.93%) and 34.72 Baht (9.34%), respectively. The external cost per inpatient day comprised of opportunity cost, food cost, and travelling cost that amounted 232.18 Baht (57.07%), 87.72 Baht (21.56%) and 86.96 Baht (21.34%), respectively. In summary, the total external cost per outpatient visit was 371.61 Baht. The total external cost per inpatient day was 406.86 Baht.

In summary, total cost of antiretroviral therapy under UC in the 2008 fiscal year was 11,366,561.18 Baht. For the purpose of computing from total cost divided with outpatient visit or inpatient day, the cost per outpatient visit was 1,380.87 Baht, as for the cost per inpatient day was 3,067.16 Baht.

The characteristics of samples were females 41.0 % and males 59.0 %.The average age was 40.35 year as the most age interval was 30-39 year (45.5%). The marital status was 50.0% for married status. As for the highest education level was elementary school (54.0%), Most of samples (84.5%) were employed, as for the most proportion occupation was 42.5% for private employee. In health status of samples was mean of duration on ARVs in outpatient was 3.34 year and 3.43 year for inpatient. At the first mean CD4 of outpatient samples was 88.86 cells/cu.mm, afterward 6 months, CD4 was 232.23 cells/cu.mm which means increasing CD4 was 143.37 cells/cu.mm. As for the first mean CD4 of inpatient samples was 80.43 cells/cu.mm, afterward 6 months, CD4 was 202.70 cells/cu.mm which means increasing CD4 was 122.27 cells/cu.mm. The score of health status of outpatient was 82.51 scores and inpatient was 77.83 scores, therefore outpatient more than inpatient was 4.63 scores. The score of adherence of outpatient was 92.51 scores and inpatient was 92.21 scores, in other words outpatient was much the same score as inpatient. In the category of socio-economic status, the average monthly income of outpatient was 3,250.31 Baht and inpatient was 3,177.50 Baht. The decrease of opportunistic infection rate between pre- and post-ART was 40.5%. In addition to the opportunistic infection that mostly occurred in both pre-ART and post-ART was tuberculosis infection.

To measure the concerns about the importance of ART service was to estimate attitude of samples, as 95.5% of total samples were highly concerned. The same was about their concerns of the importance of adherence in ARVs: it was 98.0% of the total samples amougst the highest concerned. As for the satisfaction of receiving ART, the most samples were 77.5% for highest satisfaction. In our questionnaire about AIDS understanding test of samples had 6 items. From interviews result, 56.3% of outpatient and 60.0% of inpatient samples got full marks.

For the average of willingness to pay of outpatient was 426.06 Baht per outpatient visit, as for the average of WTP of inpatient was 874.50 Baht per admit. That gross benefit-cost ratio of outpatient was 5.31 and gross benefit-cost ratio of inpatient was 4.06 which would accept the project when benefit per cost value more than 1. It was shown that ART was worth to implement continuously.

Recommendations

Recommendation from finding

1. The most proportion of total cost was medical care cost so the management of medication and laboratory test are extremely important at both the hospital and national levels. Each hospital could do todispensing ARVs according to actual taking and enough for follow up date. It would assist to decrease unefficacy ARVs and decrease using ARVs with people living with AIDS that did not to access to ART service affect to increase ARVs resistance before access to ART.

2. The emphasis on screening patients with AIDS for the purpose of receiving ART service should have clearly criteria and understanding test before access to ART. The objective should have to increase awareness of worth of antiretroviral therapy and to assure the worth of adherence for a better health.

Recommendation for further study

1. The study of cost analysis in hospital, if there is assurance of the database and the time might be analysed by activity based costing method of

antiretroviral therapy for both the outpatient and the inpatient. After realizing what activity used the most cost, it should be increasingly awared.

2. The benefit measurement with willingness to pay should be used with new intervention or new program such as vaccine, new drugs.

3. The recommendation is the extension of samples in other study sites. The benefit would makes an extenxion of the characteristic of samples and the results extended could be taken to the national level.

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APPENDIX

DOCUMENT OF EHICAL CLEARANCE

COA. No. MU-IRB 2009/156.2107

Documentary Proof of Mahidol University Institutional Review Board

Title of Project: Cost-benefit Analysis of Antiretroviral Therapy to Adult Patients with AIDS under The Universal Health Coverage in Chiangrai Regional Hospital (Thesis for Master Degree)

Principle Investigator: Miss Wannee Chaisiripenpak

Name of Institution: Faculty of Public Health

Approval includes: 1) MU-IRB Submission form version received date 17 July 2009
2) Participant Information Sheet for Pateint version date 17 July 2009
3) Participant Information Sheet for Staff version date 17 July 2009
4) Informed Consent form for Patient version date 17 July 2009
5) Informed Consent form for Staff version date 17 July 2009
6) Questionnaire version received date 20 July 2009
7) Interview Guideline version received date 20 July 2009

Mahidol University Institutional Review Board is in full compliance with International Guidelines for Human Research Protection such as Declaration of Helsinki, The Belmont Report, CIOMS Guidelines and the International Conference on Harmonization in Good Clinical Practice (ICH-GCP)

Date of Approval: 21 July 2009

Date of Expiration: 20 July 2010

Signature of Chairman: .....
(Professor Shusee Visalyaputra)

Signature of Head of the Institute: .....
(Associate Professor Sansanee Chaiyaroj)
Vice President for Research and Academic Affairs

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ที่ ชร 0027.102/ 2596 2

เอกสารรับรองโครงการวิจัย

โดย

คณะกรรมการพิจารณาด้านจริยธรรมในการศึกษาวิจัยทางชีวเวชศาสตร์

โรงพยาบาลเชียงรายประชานุเคราะห์

คณะกรรมการพิจารณาด้านจริยธรรมในการศึกษาวิจัยทางชีวเวชศาสตร์ โรงพยาบาลเชียงราย-ประชานุเคราะห์ ขอรับรองว่า

โครงการวิจัย : การวิเคราะห์ต้นทุน-ผลได้ของการให้ยาต้านไวรัสเอดส์ในการรักษาผู้ป่วยโรคเอดส์ผู้ใหญ่ ภายใต้ระบบหลักประกันสุขภาพถ้วนหน้า ในโรงพยาบาลเชียงรายประชานุเคราะห์ จังหวัดเชียงราย

ของ : นางสาววรรณี ชัยศิริเพ็ญภาค

สังกัด : ภาควิชาบริหารงานสาธารณสุข คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล

ได้รับการพิจารณาแล้ว เห็นว่า ไม่มีการล่วงละเมิดสิทธิ สวัสดิภาพ และไม่ก่อให้เกิดภยันตรายแก่อาสาสมัครที่เข้าร่วมการวิจัย

จึงเห็นสมควรให้ดำเนินการวิจัยในโรงพยาบาลเชียงรายประชานุเคราะห์ตามขอบข่ายของโครงการวิจัย ที่เสนอได้ ระหว่างวันที่ 11 มิถุนายน 2552 ถึงวันที่ 10 มิถุนายน 2553

ออกให้ ณ วันที่ 9 กันยายน 2552

ลงนาม.....

(แพทย์หญิงพัชรี ขันติพงษ์)

ประธานกรรมการพิจารณาด้านจริยธรรม

ในการศึกษาวิจัยทางชีวเวชศาสตร์

ลงนาม.....

(นายแพทย์สุภัค ปิติภากร)

รักษาการ ผู้อำนวยการ

โรงพยาบาลเชียงรายประชานุเคราะห์

INFORMED CONSENT FORM

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ
(สำหรับผู้ให้บริการยาต้านไวรัสและดูแลรักษาผู้ป่วยโรคภูมิคุ้มกันบกพร่อง)

วันที่..... เดือน..... พ.ศ.....

ข้าพเจ้า.....อายุ.....ปี อาศัยอยู่บ้านเลขที่.....

ถนน..... ตำบล.....อำเภอ.....

จังหวัด.....รหัสไปรษณีย์.....โทรศัพท์ .....

ขอแสดงเจตนายินยอมเข้าร่วมโครงการวิจัยเรื่อง **การวิเคราะห์ต้นทุน-ผลได้ของการให้ยาต้านไวรัสเอดส์ในการรักษาผู้ป่วยโรคเอดส์ผู้ใหญ่ ภายใต้ระบบหลักประกันสุขภาพถ้วนหน้า ในโรงพยาบาลเชียงรายประชานุเคราะห์**

โดยข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและจุดมุ่งหมายในการทำวิจัยรายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ รวมถึงทราบประโยชน์ที่คาดว่าจะได้รับของการวิจัยและความเสี่ยงที่อาจจะเกิดขึ้นจากการเข้าร่วมการวิจัย รวมทั้งแนวทางป้องกันและแก้ไขหากเกิดอันตรายขึ้น โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด อีกทั้งยังได้รับคำอธิบายและตอบข้อสงสัยจากหัวหน้าโครงการวิจัยเป็นที่เรียบร้อยแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมในโครงการวิจัยนี้

หากข้าพเจ้ามีข้อข้องใจเกี่ยวกับขั้นตอนของการวิจัย ข้าพเจ้าสามารถติดต่อกับ นางสาววรรณี ชัยศิริเพ็ญภาค ภาควิชาบริหารงานสาธารณสุข คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล ถ. ราชวิถี เขตราชเทวี กรุงเทพฯ 10400 โทรศัพท์ 02-6409853 โทรสาร 02-6409853 หมายเลขโทรศัพท์มือถือ 085-3229507 E-mail address: phar092@yahoo.com

หากข้าพเจ้าได้รับการปฏิบัติไม่ตรงตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถติดต่อกับประธานคณะกรรมการจริยธรรมการวิจัยในคนหรือผู้แทน ได้ที่สำนักงานคณะกรรมการจริยธรรมการวิจัยในคน สำนักงานอธิการบดีมหาวิทยาลัยมหิดล ถนนพุทธมณฑล สาย 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม 73170 หมายเลขโทรศัพท์ 02-849-6223-5 โทรสาร 02-849-6223

ข้าพเจ้าได้ทราบถึงสิทธิ์ที่ข้าพเจ้าจะได้รับข้อมูลเพิ่มเติม ทั้งทางด้านประโยชน์และโทษจากการเข้าร่วมการวิจัย และสามารถถอนตัวหรือองดเข้าร่วมการวิจัยได้ทุกเมื่อ โดยจะไม่มีผลกระทบต่อการปฏิบัติงานของข้าพเจ้าในอนาคต และยินยอมให้ผู้วิจัยใช้ข้อมูลส่วนตัวของข้าพเจ้าที่ได้รับจากการวิจัย แต่จะไม่เผยแพร่ต่อสาธารณะเป็นรายบุคคล โดยจะนำเสนอเป็นข้อมูลโดยรวมจากการวิจัยเท่านั้น

ข้าพเจ้าเข้าใจข้อความในเอกสารชี้แจงผู้เข้าร่วมการวิจัย และหนังสือแสดงเจตนายินยอมนี้โดยตลอดแล้ว จึงลงลายมือชื่อไว้

ลงชื่อ.....ผู้เข้าร่วมการวิจัย/ผู้แทนโดยชอบธรรม

(.....) วันที่.....

ลงชื่อ.....หัวหน้าโครงการวิจัย

(.....) วันที่.....

ลงชื่อ.....พยาน

(.....) วันที่.....

หนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจ
(สำหรับผู้ใช้บริการยาต้านไวรัส และบริการดูแลโรคภูมิคุ้มกันบกพร่อง)

วันที่..... เดือน..... พ.ศ.....

ข้าพเจ้า.....อายุ.....ปี อาศัยอยู่บ้านเลขที่.....

ถนน.....ตำบล.....อำเภอ.....

จังหวัด.....รหัสไปรษณีย์.....โทรศัพท์.....

ขอแสดงเจตนายินยอมเข้าร่วมโครงการวิจัยเรื่อง **การวิเคราะห์ต้นทุน-ผลได้ของการให้ยาต้านไวรัสเอดส์ในการรักษาผู้ป่วยโรคเอดส์ผู้ใหญ่ ภายใต้ระบบหลักประกันสุขภาพถ้วนหน้า ในโรงพยาบาลเชียงรายประชานุเคราะห์**

โดยข้าพเจ้าได้รับทราบรายละเอียดเกี่ยวกับที่มาและจุดมุ่งหมายในการทำวิจัยรายละเอียดขั้นตอนต่างๆ ที่จะต้องปฏิบัติหรือได้รับการปฏิบัติ รวมถึงประโยชน์ที่คาดว่าจะได้รับของการวิจัย และความเสี่ยงที่อาจจะเกิดขึ้นจากการเข้าร่วมการวิจัย รวมทั้งแนวทางป้องกันและแก้ไขหากเกิดอันตรายขึ้น โดยได้อ่านรายละเอียดในเอกสารชี้แจงผู้เข้าร่วมการวิจัยโดยตลอด อีกทั้งยังได้รับคำอธิบายและตอบข้อสงสัยจากหัวหน้าโครงการวิจัยเป็นที่เรียบร้อยแล้ว

ข้าพเจ้าจึงสมัครใจเข้าร่วมในโครงการวิจัยนี้

หากข้าพเจ้ามีข้อข้องใจเกี่ยวกับขั้นตอนของการวิจัย ข้าพเจ้าสามารถติดต่อกับ นางสาววรรณี ชัยศิริเพ็ญภาค ภาควิชาบริหารงานสาธารณสุข คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล ถ. ราชวิถี เขตราชเทวี กรุงเทพฯ 10400 หมายเลขโทรศัพท์ 02-6409853 โทรสาร 02-6409853โทรศัพท์มือถือ 085-3229507 E-mail address: phar092@yahoo.com

หากข้าพเจ้าได้รับการปฏิบัติไม่ตรงตามที่ระบุไว้ในเอกสารชี้แจงผู้เข้าร่วมการวิจัย ข้าพเจ้าสามารถติดต่อกับประธานคณะกรรมการจริยธรรมการวิจัยในคนหรือผู้แทน ได้ที่สำนักงานคณะกรรมการจริยธรรมการวิจัยในคน สำนักงานอธิการบดี มหาวิทยาลัยมหิดล ถนนพุทธมณฑล สาย 4 ตำบลศาลายา อำเภอพุทธมณฑล จังหวัดนครปฐม 73170 หมายเลขโทรศัพท์ 02-849-6223-5 โทรสาร 02-849-6223

ข้าพเจ้าได้ทราบถึงสิทธิ์ที่ข้าพเจ้าจะได้รับข้อมูลเพิ่มเติมทั้งทางด้านประโยชน์และโทษจากการเข้าร่วมการวิจัย และสามารถถอนตัวหรือลาออกจากการเข้าร่วมการวิจัยได้ทุกเมื่อ โดยจะไม่มีผลกระทบต่อการใช้บริการและการรักษาพยาบาลที่ข้าพเจ้าจะได้รับต่อไปในอนาคต และยินยอมให้ผู้วิจัยใช้ข้อมูลส่วนตัวของข้าพเจ้าที่ได้รับจากการวิจัย แต่จะไม่เผยแพร่ต่อสาธารณะเป็นรายบุคคล โดยจะนำเสนอเป็นข้อมูลโดยรวมจากการวิจัยเท่านั้น

ข้าพเจ้าเข้าใจข้อความในเอกสารชี้แจงผู้เข้าร่วมการวิจัยและหนังสือแสดงเจตนายินยอมนี้โดยตลอดแล้วจึงลงลายมือชื่อไว้

ลงชื่อ.....ผู้เข้าร่วมการวิจัย/ผู้แทนโดยชอบธรรม

(.....) วันที่.....

ลงชื่อ..... หัวหน้าโครงการวิจัย

(.....) วันที่.....

ลงชื่อ.....พยาน

(.....) วันที่.....

ในกรณีที่ข้าพเจ้าไม่สามารถอ่านหนังสือได้ ผู้วิจัยได้อ่านข้อความในหนังสือแสดงเจตนายินยอมเข้าร่วมการวิจัยโดยได้รับการบอกกล่าวและเต็มใจนี้ให้แก่ข้าพเจ้าฟังจนเข้าใจดีแล้ว ข้าพเจ้าจึงลงนาม หรือประทับลายนิ้วหัวแม่มือของข้าพเจ้าในใบยินยอมนี้ด้วยความเต็มใจ

ลงชื่อ.....ผู้เข้าร่วมการวิจัย

(.....) วันที่.....

ลงชื่อ.....พยาน

(.....) วันที่.....

AIDS-DEFINING ILLNESS OF MMWR1993

Category A consists of one or more of the conditions listed below in an adolescent or adult (greater than or equal to 13 years) with documented HIV infection. Conditions listed in Categories B and C must not have occurred.

Asymptomatic HIV infection

Persistent generalized lymphadenopathy

Acute (primary) HIV infection with accompanying illness or history of acute HIV infection

Category B consists of symptomatic conditions in an HIV-infected adolescent or adult that are not included among conditions listed in clinical Category C and that meet at least one of the following criteria: a) the conditions are attributed to HIV infection or are indicative of a defect in cell-mediated immunity; or b) the conditions are considered by physicians to have a clinical course or to require management that is complicated by HIV infection. Examples of conditions in clinical Category B include, but are not limited to:

Bacillary angiomatosis

Candidiasis, Oropharyngeal (thrush)

Candidiasis, Vulvovaginal; persistent, frequent, or poorly responsive to therapy

Cervical dysphasia (moderate to severe) / cervical carcinoma in situ

Consititutional symptoms such as fever (38.5° C) or diarrhea lasting greater than month

Hairy leukoplakia, oral

Herpes zoster (shingles), involving at least two distinct episodes or more than one dermatome

Idiopathic thrombocytopenia purpura (ITP)

Listeiosis

Pelvic inflammatory disease, particularly if complicated by tubo-ovarian abscess

Peripheral neuropathy

Category C includes the clinical conditions listed in the AIDS surveillance case definition (Appendix B). For classification purposes, once a Category C condition has occurred, the person will remain in Category C.

Candidiasis of bronchi, trachea, or lungs

Candidiasis. Esophageal

Cervical cancer, invasive

Coccidioidomycosis, disseminated of extrapulmonary

Cryptococcosis, extrapulmonary

Cryptosporidiosis, chronic interstinal (>1 –month duration)

Cytomegalovirus disease (other than liver, spleen or nodes)

Cytomegalovirus retinitis (with loss of vision)

Encephalopathy, HIV- related

Herpes simplex; chronic ulcer (s) (>1 month duration); or bronchitis, pneumonitis, or esophagitis

Histoplasmosis, disseminated or extrapulmonary

Isosposis, chronic intestinal (>1 month duration)

Kaposi sarcoma

Lymphoma, Burkitt's (or equivalent term)

Lymphoma, immunoblastic (or equivalent term)

Lymphoma, primary, of brain

Mycobacterium avium complex or M. Kansasii, disseminated of extrapulmonary

Mycobacterium tuberculosis, any site (pulmonary or extrapulmonary)

Mycobacterium, other species or unidentified species, disseminated of extrapulmonary

Pneumocystic jiroveci pneumonia

Pneumonia, recurrent

Progressive multifocal leukoencephalopathy (PML)

Salmonella septicemia, recurrent

Toxoplasmosis of brain

Wasting syndrome due to HIV

INDICATIONS FOR INITIATION OF ANTIRETROVIRAL THERAPY

Clinical category	CD 4 (cells/cu.mm)	Recommendation
AIDS-defining illness*	Any value	Treat antiretroviral drugs
Symtomatic **	Any value	Treat antiretroviral drugs
Asymptomatic	Less than 200	Treat antiretroviral drugs
Asymptomatic	200 – 350	Still do not start antiretroviral drugs, follow up clinical symptom and CD4 level every 3 months***
Asymptomatic	More than 350	Still do not start antiretroviral drugs, follow up clinical symptom and CD4 level every 6 months

* Appendix: AIDS-defining illness

** That symptom such as candidiasis, Pruritic Popular Eruptions (PPE), unreasonable chronic fever, unreasonable chronic diarrhea >14 days and involuntary weight loss> 10 % in 3 months etc. So that should be given the prophylaxis drugs within patient who have AIDS-defining illness but do not start with ARVs at the same time.

*** In patient who have CD4 level 200-250 cells/cu.mm might be considered to dispensing ARVs about 2 months after start antituberculosis drugs in some cases such as unmeasurable CD4 level in 3 months

DATA COLLECTING FORM IN THIS THESIS (TRANSLATION VERSION)

เครื่องมือแบบสัมภาษณ์และแบบบันทึกข้อมูลในการรวบรวมข้อมูล ประกอบด้วย 3 ชุด มีดังนี้

ชุดที่ 1 แบบบันทึกต้นทุน ด้านผู้ให้บริการ ประกอบด้วย

ส่วนที่ 1 แบบบันทึกต้นทุนค่าแรง

1.1 แบบบันทึกรายได้ของเจ้าหน้าที่ ทั้งที่เป็นค่าแรง ค่าตอบแทน และค่าสวัสดิการอื่นๆ

1.2 แบบบันทึกชั่วโมงการทำงานของเจ้าหน้าที่ในหน่วยงานที่เกี่ยวข้องกับการให้บริการยาต้านไวรัสเอดส์

1.3 แบบบันทึกสรุปต้นทุนค่าแรงของเจ้าหน้าที่

ส่วนที่ 2 ต้นทุนค่าวัสดุ

2.1 แบบบันทึกค่าวัสดุการแพทย์และสำนักงาน

2.2 แบบบันทึกค่าสาธารณูปโภค

2.3 แบบบันทึกต้นทุนที่ไม่ได้เก็บค่าบริการอื่นๆ

ส่วนที่ 3 ต้นทุนค่าลงทุน

3.1 แบบบันทึกต้นทุนอาคารและสิ่งก่อสร้าง

3.2 แบบบันทึกครุภัณฑ์สำนักงานและการแพทย์

ส่วนที่ 4 แบบสรุปต้นทุนที่เก็บค่าบริการทางการแพทย์

4.1 แบบบันทึกการตรวจทางห้องปฏิบัติการ การทำหัตถการ ค่ายา และค่าเวชภัณฑ์ที่ไม่ใช่ยา

4.2 แบบสรุปต้นทุนการให้บริการทางการแพทย์

ส่วนที่ 5 แบบสรุปต้นทุนการให้บริการยาต้านไวรัสเอดส์

5.1 แบบสรุปต้นทุนที่ไม่ได้เก็บค่าบริการ

5.2 แบบสรุปต้นทุนทั้งหมดของผู้ให้บริการ

ชุดที่ 2 แบบสัมภาษณ์ผู้ใช้บริการ หรือผู้ป่วยและ/หรือญาติ ประกอบด้วย

ส่วนที่ 1 ข้อมูลส่วนบุคคลของผู้ป่วย

ส่วนที่ 2 แบบสัมภาษณ์ความเต็มใจที่จะจ่าย

ส่วนที่ 3 ข้อมูลการมารับบริการของผู้ป่วยและข้อมูลการสูญเสียโอกาสในการทำงาน

ส่วนที่ 4 แบบสัมภาษณ์ค่าใช้จ่ายที่เกิดขึ้นจากการติดตามดูแลผู้ป่วยของญาติหรือผู้ติดตาม

ชุดที่ 3 แบบบันทึกคัดลอกแฟ้มประวัติ

ชุดที่ 1 แบบบันทึกต้นทุน ด้านผู้ให้บริการ

ส่วนที่ 1 ต้นทุนค่าแรง

1.1 แบบบันทึกรายได้ของเจ้าหน้าที่ ทั้งที่เป็นค่าแรง ค่าตอบแทน และค่าสวัสดิการ

วันที่เก็บข้อมูล…..... ผู้บันทึกข้อมูล…….…….....

หน่วยงาน……...……...……

ลำดับ	รหัสจนท.	ตำแหน่ง	เงินเดือน (บาท)	เงินประจำตำแหน่ง (บาท)	ค่ารักษาพยาบาล (บาท)	ค่าล่วงเวลา (บาท)	ค่าเล่าเรียนบุตร (บาท)	ค่าเช่าบ้าน (บาท)	เงินพิเศษอื่นๆ (บาท)	รวม (บาท)
1.										
2.										
3.										
4.										
5.										
6.										
7.										
รวมทั้งสิ้น										

1.2 ชั่วโมงการทำงานของเจ้าหน้าที่ในหน่วยงานที่เกี่ยวข้องกับการให้บริการยาต้านไวรัสเอดส์ วันที่เก็บข้อมูล….....….. ผู้บันทึกข้อมูล…….

หน่วยงาน……...……...……

ลำดับ	รหัสเจ้าหน้าที่	วันลาพักผ่อน	วันลากิจ	วันลาป่วย	ชั่วโมงการทำงานทั้งปี
1.					
2.					
3.					
4.					
5.					
6.					
7.					
รวมทั้งสิ้น					

1.3 สรุปต้นทุนค่าแรงเจ้าหน้าที่

วันที่เก็บข้อมูล…..... ผู้บันทึกข้อมูล…….…….....

หน่วยงาน……...……...……

ลำดับ	รหัสเจ้าหน้าที่	ชั่วโมงการทำงานทั้งปี (จาก 1.2)	ค่าแรงรวมทั้งปี	จำนวนชั่วโมงที่ดูแลรักษาผู้ป่วยต่อราย	จำนวนผู้ป่วยที่ดูแลทั้งหมด	จำนวนชั่วโมงที่ดูแลผู้ป่วยทั้งหมด	ต้นทุนค่าแรงในการดูแลผู้ป่วยทั้งหมด
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							

ส่วนที่ 2 ต้นทุนค่าวัสดุ

2.1 แบบบันทึกค่าวัสดุการแพทย์และสำนักงาน

วันที่เก็บข้อมูล…...............…………………… ผู้บันทึกข้อมูล…………………………..……......

หน่วยงาน…………...…………………………………………………………...………………

รายการ	จำนวน	ราคาต่อหน่วย (บาท)	รวมทั้งสิ้น (บาท)

2.2 แบบบันทึกค่าสาธารณูปโภค

วันที่เก็บข้อมูล…..…… ผู้บันทึกข้อมูล…….…….....

หน่วยงาน……...……...……

หมวดค่าสาธารณูปโภค	ค่าใช้จ่าย (บาท)
ค่าไฟฟ้า	
ค่าน้ำ	
ค่าไปรษณีย์	
ค่าโทรศัพท์	
รวมค่าสาธารณูปโภค **(1)**	

ผลผลิตการให้บริการของโรงพยาบาล	จำนวน
จำนวนผู้ป่วยนอก (ราย)	
จำนวนชั่วโมงผู้ป่วยนอกเฉลี่ยต่อราย*	
จำนวนชั่วโมงผู้ป่วยนอกโดยรวม (ชั่วโมง) **(2)**	
จำนวนผู้ป่วยใน (ราย)	
จำนวน Length of stay (วัน)	
จำนวน Length of stay (ชั่วโมง) **(3)**	
จำนวนชั่วโมงรวม **(2)+(3)**	

* ได้จากค่าเฉลี่ยของเวลาในการรับบริการจากกลุ่มงานผู้ป่วยนอก

ต้นทุนค่าสาธารณูปโภค	จำนวน
ต้นทุนค่าสาธารณูปโภคโดยเฉลี่ย (บาท/ชั่วโมง) **= ((2)+(3)) /(1)**	
จำนวนชั่วโมงที่ดูแลรักษาผู้ป่วย (ของเจ้าหน้าที่ทั้งหมด)	
ต้นทุนค่าสาธารณูปโภคโดยรวมที่ดูแลรักษาผู้ป่วยทั้งหมด (บาท)	

2.3 แบบบันทึกต้นทุนที่ไม่ได้เก็บค่าบริการอื่นๆ

วันที่เก็บข้อมูล…..…… ผู้บันทึกข้อมูล…….…….....

หน่วยงาน……...……...……

รายการ	จำนวน	ราคาต่อหน่วย	รวมเป็นเงิน (บาท)
1. ค่าอาหาร (โรงพยาบาล)			
2. อื่นๆ ระบุ			
รวมทั้งสิ้น			

ส่วนที่ 3 ต้นทุนค่าลงทุน

3.1 แบบบันทึกต้นทุนอาคารและสิ่งก่อสร้าง

รายชื่ออาคารที่ใช้	**งบประมาณการก่อสร้างอาคาร (บาท) ณ ปีนั้น**	**ก่อสร้างแล้วเสร็จ (เดือน พ.ศ.)**	**จำนวนปีที่ใช้งานมาแล้ว (ปี)**	**สัดส่วนการใช้งานในโครงการ**

3.2 แบบบันทึกครุภัณฑ์สำนักงานและการแพทย์

วันที่เก็บรวบรวมข้อมูล…….....ผู้บันทึก…….หน่วยงาน…….....

รายการ	**อายุการใช้งาน**	**ราคา**	**ปีที่ได้รับ**	**จำนวนปีที่ใช้งาน**	**ค่าเสื่อมราคา (บาท)**
รวมทั้งสิ้น					

ส่วนที่ 4 แบบสรุปต้นทุนที่เก็บค่าบริการทางการแพทย์

4.1 แบบบันทึกค่าตรวจทางห้องปฏิบัติการ การทำหัตถการ ค่ายา และค่าเวชภัณฑ์ที่ไม่ใช่ยา

ลำดับ	ค่ายา				ค่าตรวจทางห้องปฏิบัติการ				ค่าตรวจรังสีวิทยา				ค่าบริการอื่นๆ			
	รายการ	จำนวน	ราคาต่อหน่วย	รวมเป็นเงิน	รายการ	จำนวน	ราคาต่อหน่วย	รวมเป็นเงิน	รายการ	จำนวน	ราคาต่อหน่วย	รวมเป็นเงิน	รายการ	จำนวน	ราคาต่อหน่วย	รวมเป็นเงิน
	รวมเป็นเงิน				**รวมเป็นเงิน**				**รวมเป็นเงิน**				**รวมเป็นเงิน**			

4.2 แบบสรุปต้นทุนการให้บริการทางการแพทย์

แผนก	ต้นทุนทางการแพทย์	ค่ายา	ค่าตรวจทางห้องปฏิบัติการ	ค่าตรวจรังสีวิทยา	ค่าบริการอื่นๆ	รวมทั้งสิ้น
ผู้ป่วยนอก	ต้นทุนรวม					
	จำนวนครั้งรับบริการ					
	ต้นทุนต่อครั้งมารับบริการ					
ผู้ป่วยใน	ต้นทุนรวม					
	จำนวนวันนอน					
	ต้นทุนต่อวันนอน					

ส่วนที่ 5 แบบสรุปต้นทุนการให้บริการยาต้านไวรัสเอดส์

5.1 แบบสรุปต้นทุนที่ไม่ได้เก็บค่าบริการ (Routine service cost)

ต้นทุนที่ไม่เก็บค่าบริการ	ต้นทุนค่าแรง (1.3)		ต้นทุนค่าดำเนินการ						ต้นทุนค่าลงทุน			
			ค่าวัสดุ (2.1)		ค่าสาธารณูปโภค (2.2)				ค่าวัสดุ (2.1)		ค่าสาธารณูปโภค (2.2)	
	ต้นทุนรวม	ต้นทุนต่อหน่วย	ต้นทุนรวม	ต้นทุนต่อหน่วย	ต้นทุนรวม	ต้นทุนต่อหน่วย	ต้นทุนรวม	ต้นทุนต่อหน่วย	ต้นทุนรวม	ต้นทุนต่อหน่วย	ต้นทุนรวม	ต้นทุนต่อหน่วย
ผู้ป่วยนอก ..... ครั้งมารับบริการ												
ผู้ป่วยใน ..... วันนอน												

5.2 แบบสรุปต้นทุนทั้งหมดของผู้ให้บริการ

ต้นทุนทั้งหมด	ต้นทุนที่ไม่ได้เก็บค่าบริการ (routine service cost) (5.1)						ต้นทุนการให้บริการทางการแพทย์ (4.2)		รวมต้นทุน	
	ต้นทุนค่าแรง		ต้นทุนค่าดำเนินการ		ค่าลงทุน					
	ต้นทุนรวม	ต้นทุนต่อราย	ต้นทุนรวม	ต้นทุนต่อราย	ต้นทุนรวม	ต้นทุนต่อราย	ต้นทุนรวม	ต้นทุนต่อราย	ต้นทุนรวม	ต้นทุนต่อราย
ผู้ป่วยนอก										
ผู้ป่วยใน										

ชุดที่ 2 แบบสัมภาษณ์ผู้ใช้บริการ หรือผู้ป่วยและ/หรือญาติ

ประกอบด้วย

ส่วนที่ 1 ข้อมูลส่วนบุคคลของผู้ป่วย
ส่วนที่ 2 แบบสัมภาษณ์ความเต็มใจที่จะจ่าย
ส่วนที่ 3 ข้อมูลการมารับบริการของผู้ป่วยและข้อมูลการสูญเสียโอกาสในการทำงาน
ส่วนที่ 4 แบบสัมภาษณ์ค่าใช้จ่ายที่เกิดขึ้นจากการติดตามดูแลผู้ป่วยของญาติหรือผู้ติดตาม

การตอบแบบสัมภาษณ์โดยกาเครื่องหมาย ✓ลงในช่องว่าง ☐ ในข้อที่ต้องการเพียงข้อเดียว หรือกรอกข้อความ/ ตัวเลข ลงในช่องว่างที่ระบุไว้

วัน/เดือน/ปี ที่สัมภาษณ์ ...../……../ 2552

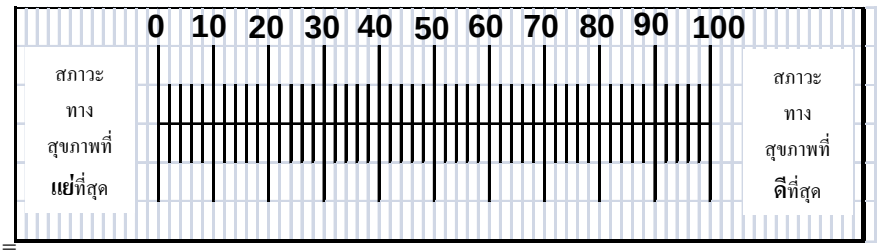
เกณฑ์การคัดเข้า

- ☐ เป็นผู้ป่วยโรคเอดส์ที่มีอายุตั้งแต่ 18 ปีขึ้นไป (นับอายุ 18 ปี ถึงวันที่เก็บข้อมูล)
- ☐ เป็นผู้ป่วยโรคเอดส์ทุกราย ทั้งชายและหญิง ที่มารับบริการยาต้านไวรัสเอดส์ ในโรงพยาบาลเชียงรายประชานุเคราะห์
- ☐ ผู้ป่วยโรคเอดส์ในกลุ่มที่ได้รับยา เป็นผู้ป่วยที่ได้สมัครเข้ารับยาในสิทธิหลักประกันสุขภาพถ้วนหน้า มี NAP Number และรับยาในสูตรพื้นฐานกลุ่ม A คือ GPO-VIR®S30 เป็นระยะเวลาอย่างน้อย 12 เดือน
- ☐ ผู้ป่วยโรคเอดส์ไม่มีประวัติการเปลี่ยนสูตรยา
- ☐ ผู้ป่วยโรคเอดส์ที่มีการประเมิน Adherence ด้วยแบบประเมินตนเอง ด้วยเครื่องมือ Visual Analog Scale
- ☐ ผู้ป่วยโรคเอดส์ที่มีข้อมูลในแฟ้มประวัติการรักษาที่ครบถ้วน

เวลาที่เริ่มสัมภาษณ์.....เสร็จสิ้นการสัมภาษณ์.....

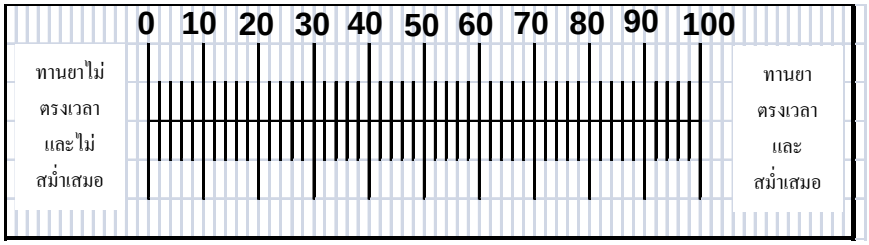
นางสาววรรณี ชัยศิริเพ็ญภาค รหัสประจำตัว 5037062
คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล

ส่วนที่ 1 : ข้อมูลส่วนบุคคล		**ID**.....	
ข้อมูลส่วนบุคคลของผู้ป่วย			
Q21001	เพศ	☐ 1.ชาย ☐ 2.หญิง	
Q21002	วัน/เดือน/ปี เกิด (ระบุวัน/เดือน/ปี)	...../……/……..(อายุ……ปี)	
Q21003	ภูมิลำเนาที่ระบุในสิทธิการรักษาพยาบาล (ในบัตรทอง)	1) สถานบริการ..... 2) สถานบริการ.....	
Q21004	สถานภาพสมรส	☐ 1.โสด ☐ 2. สมรส ☐ 3. หย่า ☐ 4. หม้าย	
Q21005	ระดับการศึกษาสูงสุดของผู้ป่วย ที่สำเร็จการศึกษา หรือระดับการศึกษาที่กำลังเรียนอยู่	☐ 0. ไม่ได้ศึกษา ☐ 1. ประถมศึกษา ☐ 2. มัธยมต้น ☐ 3. มัธยมปลาย/ ปวส./ปวช. ☐ 4. ปริญญาตรี หรือสูงกว่า	
ข้อมูลที่พักอาศัย			
Q21006	ลักษณะที่พักอาศัย	☐ 1. บ้านเดี่ยว ☐ 2. บ้านทาวเฮาส์ ☐ 3. อพาร์ทเมนท์ ☐ 4. ห้องเช่า ☐ 5. ตึกแถว ☐ 6. อื่นๆ (ระบุ).....	
Q21007	ที่พักอาศัยเป็นบ้านที่ครอบครัว	☐ 1. เป็นเจ้าของเอง ☐ 2. เช่า (Q21007a).....บาทต่อเดือน ☐ 3. อาศัยอยู่โดยไม่เสียค่าใช้จ่าย ☐ 4. อื่นๆ (Q21007b).....	
Q21008	บ้านของผู้ป่วยมีห้องทั้งหมดกี่ห้อง	จำนวน….....ห้อง	
Q21009	มีห้องนอนกี่ห้อง	จำนวน.....ห้อง	
Q21010	ที่พักอาศัยของท่านมีสิ่งต่อไปนี้หรือไม่	☐ a. ห้องครัว ☐ b. ห้องอาบน้ำหรือฝักบัว ☐ c. ห้องส้วมชักโครก ☐ d. ไฟฟ้า ☐ e. ประปา ☐ f. ตู้เย็น ☐ g. โทรศัพท์บ้าน ☐ h. โทรศัพท์มือถือ ☐ i. โทรทัศน์ ☐ j. เตารีด ☐ k. วิทยุ ☐ l. พัดลม	

		☐ m. เครื่องปรับอากาศ ☐ n. คอมพิวเตอร์ ☐ o. รถจักรยาน ☐ p. รถจักรยานยนต์ ☐ q. รถยนต์					
รายละเอียดการมาใช้บริการ							
Q21011	แผนกที่มารับการรักษา	☐ 1. แผนกผู้ป่วยนอกทั่วไป ☐ 2. คลินิกยาต้านไวรัสเอดส์ ☐ 3. แผนกผู้ป่วยใน ตึก (Q21011a).....					
Q21012	ความถี่ในการมาใช้บริการ (แผนกผู้ป่วยนอก)	☐ 1. ทุกสัปดาห์ ☐ 2. ทุก 2 สัปดาห์ ☐ 3. ทุก เดือน ☐ 4. ทุก 2 เดือน ☐ 5. ทุก 3 เดือน ☐ 6. ทุก 4 เดือน					
Q21013	ผู้ป่วยเคยมารับการรักษาในแผนกผู้ป่วยในหรือไม่ ในโรงพยาบาลเชียงรายประชานุเคราะห์ และตึกผู้ป่วยอะไร (ในรอบปีงบประมาณ พ.ศ. 2551)	☐ 0. ไม่เคย ☐ 1. เคย (Q21013a).....ครั้ง ในตึกผู้ป่วย (Q21013b)..... ☐ 2. ไม่แน่ใจ					
สุขภาพโดยรวมของผู้ป่วย							
Q21014	สุขภาพของผู้ป่วยเป็นอย่างไรก่อนที่จะป่วยเป็นโรคภูมิคุ้มกันบกพร่อง	1. แย่มาก	2. แย่	3. ปานกลาง	4. ดี	5. ดีมาก	
Q21015	เพื่อช่วยให้ทราบถึงสถานะทางสุขภาพของผู้ป่วยว่าดีหรือไม่ โดยพิจารณารูปทางด้านล่าง โดยคะแนนของสภาวะดีที่สุดคือที่คะแนน 100 และสภาวะที่แย่ที่สุดคือ 0 ให้คะแนนสุขภาพในภาพรวมของผู้ป่วยเป็นอย่างไร  =……..						
รายละเอียดข้อมูลรายได้ของผู้ป่วย							
Q21016	Q21016a :อาชีพของตนเอง	☐ 1. อาชีพ (Q21016aa).....(ไปที่Q21017) ☐ 2. ไม่ได้ประกอบอาชีพ (ไปที่Q21016b)					

	Q21016b : เหตุผลที่ไม่ได้ประกอบอาชีพ	☐ 1. กำลังศึกษา ☐ 2. แม่บ้าน ☐ 3. ยังหางานไม่ได้ ☐ 4. อายุมาก/ชรา ☐ 5. สุขภาพไม่ดี ☐ 6. อื่นๆ (Q21016bb).....……....	
Q21017	รายได้ส่วนตัว	.....บาทต่อเดือน	
Q21018	รายจ่ายส่วนตัว	. .....บาทต่อเดือน	
Q21019	เงินออมส่วนตัว	. .....บาทต่อเดือน	
รายละเอียดข้อมูลของสามี / ภรรยา (ในกรณีผู้ป่วยจดทะเบียนสมรส)			
Q21020	ระดับการศึกษาสูงสุดของสามี/ภรรยา ที่สำเร็จการศึกษา หรือระดับการศึกษาที่กำลังเรียนอยู่	☐ 0. ไม่ได้ศึกษา ☐ 1. ประถมศึกษา ☐ 2. มัธยมต้น ☐ 3. มัธยมปลาย/ ปวส./ปวช. ☐ 4. ปริญญาตรี หรือสูงกว่า	
Q21021	Q21021a: อาชีพของสามี/หรือภรรยา	☐ 1. อาชีพ (Q21021aa).....(ไปที่ Q21022) ☐ 2. ไม่ได้ประกอบอาชีพ (ไปที่ Q21021b)	
	Q21021b: เหตุผลที่ไม่ได้ประกอบอาชีพ	☐ 1. กำลังศึกษา ☐ 2. แม่บ้าน ☐ 3. ทำงานที่ไม่ได้จ่ายเป็นเงิน ☐ 4. ยังหางานไม่ได้ ☐ 5. อายุมาก/ชรา ☐ 6. สุขภาพไม่ดี ☐ 7. อื่นๆ (Q21021bb).....	
Q21022	รายได้ของสามี หรือภรรยา	.....บาทต่อเดือน	
รายละเอียดของครัวเรือน			
Q21023	จำนวนสมาชิกที่อาศัยอยู่ในที่พักอาศัยขณะที่มารับการรักษา	.....คน	
Q21024	รายได้ของครัวเรือน	.....บาทต่อเดือน	
Q21025	รายจ่ายของครัวเรือน	.....บาทต่อเดือน	
Q21026	เงินออมของครัวเรือน	.....บาทต่อเดือน	
Q21027	จำนวนบุตรหรือสมาชิกในครัวเรือนที่เป็นภาระต้องเลี้ยงดู	.....คน	

ส่วนที่ 2 แบบสัมภาษณ์ข้อมูลผลได้		ID…..……..		
Q221	**ถามผู้ป่วยถึงความยินดีที่จะจ่าย**			
	หากในอนาคต ทางรัฐบาลไม่สามารถให้บริการยาต้านไวรัสภายใต้ระบบหลักประกันสุขภาพถ้วนหน้าได้ ทำให้ผู้ป่วยต้องจ่ายค่าดูแลรักษา และค่ายาต้านไวรัส ในราคาที่ท่านคิดว่าเป็นจำนวนเงินสูงสุดที่ท่านยินดีที่จะจ่าย และสามารถจ่ายได้จริงด้วยเงินสด ภายในวันนี้ เพื่อให้ได้รับบริการดังเดิม โดยต้องพิจารณาถึงรายได้ เงินเก็บ หรือเงินที่สามารถหามาได้			
Q22101	จำนวนเงินสูงสุดที่ท่านยินดีที่จะจ่ายเพื่อให้ได้รับบริการยาต้านไวรัสต่อครั้งมาใช้บริการ	จำนวน .....บาท ต่อครั้งมาใช้บริการ	เหตุผล(Q22101a)	
Q22102	แหล่งที่มาของเงินที่สามารถนำมาจ่ายเพื่อให้ได้รับบริการ	☐ 1. จากรายได้ที่เป็นเงินสดของครอบครัว ☐ 2. จากการกู้ยืมจากสมาชิกในครอบครัว ☐ 3. จากการกู้ยืมจากคนอื่นที่ไม่เป็นคนในครอบครัว ☐ 4. ไม่แน่ใจ ☐ 5. อื่น ๆ (Q22102a).....		
Q22103	การรับประทานยาต้านไวรัสเอดส์เพื่อให้มีสุขภาพที่ดีขึ้นและมี CD4 เพิ่มขึ้น คุณยินดีจะจ่ายเท่าไร	จำนวน.....บาท		
Q22104	หากมีการติดตามผล CD4 ปรากฏว่าผล CD4 มีค่าที่สูง คุณยินดีจะจ่ายเท่าไรเพื่อให้การรักษาด้วยยาต้านไวรัส ทำให้ CD4 ของคุณมีค่าคงเดิม ไม่ลดลง	จำนวน.....บาท		
Q22105	อธิบายให้ผู้ป่วยเลือกในตัวเลือกต่อไปนี้	☐ 1. ไม่ต้องรับประทานยาต้านไวรัส มีชีวิตอยู่ 5 ปี ☐ 2. ต้องรับประทานยาต้านไวรัส มีชีวิตอยู่ 10 ปี		
Q222	**ประสบการณ์ในการรับประทานยาต้านไวรัสเอดส์ สูตร GPO VIR S-30®**			
Q22201	วันที่ท่านทราบว่าตนเองมีผลเลือดเอชไอวีเป็นบวก	….(วัน/เดือน/ปี)		

Q22202	วันที่ท่านเริ่มรับประทานยาต้านไวรัสเอดส์	.....(วัน/เดือน/ปี)					
Q22203	ให้ผู้ป่วยประเมินความร่วมมือในการรับประทานยาต้านไวรัสเอดส์ (Adherence) ด้วยวิธี VAS เท่ากับ..... 						
Q22204	Q22204a ท่านเคยรับประทานยาต้านไวรัสจากสถานพยาบาลแหล่งใดมาก่อนหรือไม่	☐ 0. ไม่เคย (ไปที่ Q22205) ☐ 1. เคย (ไปที่ Q22204b)					
	Q22204b ได้ชำระเงินเป็นจำนวนเงินเท่าไร	.....บาท ต่อเดือน					
Q22205	ท่านเคยมีโรคติดเชื้อฉวยโอกาสหรือไม่อย่างไร	☐ 0. ไม่เคย ☐ 1. เคย					
Q22206	ท่านเคยเกิดผลข้างเคียงจากการใช้ยา หรือไม่อย่างไรบ้าง	☐ 0. ไม่เคย ☐ 1. เคย					
Q22207	ท่านเคยเกิดการดื้อยาหรือไม่ อย่างไรบ้าง	☐ 0. ไม่เคย ☐ 1. เคย					
Q223	**ทัศนคติต่อการให้บริการยาต้านไวรัส**						
Q22301	ความสำคัญในการรับบริการยาต้านไวรัส	1. น้อยที่สุด	2. น้อย	3. ปานกลาง	4. มาก	5. มากที่สุด	
Q22302	ความสำคัญในการรับประทานยาต้านไวรัสอย่างต่อเนื่อง และสม่ำเสมอ	1. น้อยที่สุด	2. น้อย	3. ปานกลาง	4. มาก	5. มากที่สุด	
Q22303	ความพึงพอใจต่อการให้บริการยาต้านไวรัสโดยรวม	1. น้อยที่สุด	2. น้อย	3. ปานกลาง	4. มาก	5. มากที่สุด	

Q224	**ความเข้าใจในสภาวะทางสุขภาพและผลได้ที่เกิดขึ้น**		
Q22401	ท่านเคยได้ยินข้อมูลเกี่ยวกับ CD4 หรือไม่ อย่างไร	☐ 0. ไม่เคย ☐ 1. เคย CD4 คือ (Q22401a).....	
Q22402	การรับประทานยาต้านไวรัส จะทำให้หายจากโรค ใช่หรือไม่	☐ 0. ไม่ใช่ ☐ 1. ใช่	
Q22403	การมี CD4 ที่เพิ่มขึ้น แสดงถึงร่างกายแข็งแรงขึ้น ใช่หรือไม่	☐ 0. ไม่ใช่ ☐ 1. ใช่	
Q22404	การมี CD4 ที่ลดลง ทำให้เกิดโรคติดเชื้อฉวยโอกาสได้ เช่น เชื้อราในปาก	☐ 0. ไม่ใช่ ☐ 1. ใช่	
Q22405	การรับประทานยาต้านไวรัส ทำให้ร่างกายมีระดับ CD4 ที่ลดลง ใช่หรือไม่	☐ 0. ไม่ใช่ ☐ 1. ใช่	
Q22406	การรับประทานยาต้านไวรัสที่ตรงเวลา และสม่ำเสมอ อาจทำให้ CD4 เพิ่มขึ้นได้	☐ 0. ไม่ใช่ ☐ 1. ใช่	

ส่วนที่ 3 ข้อมูลเกี่ยวกับการมาใช้บริการของผู้ป่วย และ ข้อมูลการสูญเสียโอกาสในการทำงาน (สัมภาษณ์ผู้ใช้บริการ)

ID.....

รหัสสำหรับประเภทของสถานบริการ	
1. ร้านขายยา	7. แผนกผู้ป่วยนอกใน รพ.เอกชน
2. คลินิกยาต้านไวรัส	8. ตรวจทางห้องปฏิบัติการใน รพ. เอกชน
3. สถานีอนามัย	9. ห้อง ICU ใน รพ.เอกชน
4. แผนกผู้ป่วยนอกในรพ.รัฐฯ	10. อื่นๆ…..…….….....
5. ห้องฉุกเฉินใน รพ.รัฐฯ	
6. แผนกผู้ป่วยในของ รพ.รัฐฯ	

รหัสการให้บริการ	
1. ให้น้ำเกลือ	4. เลือด
2. ยาต้านไวรัส เอดส์	5. อาหาร
3. เครื่องมือแพทย์	6. อื่น ๆ .....

การเข้ารักษา	วัน/เดือน/ปี เข้า-ออก
ครั้งที่1	เข้า
	ออก
ครั้งที่2	เข้า
	ออก
ครั้งที่3	เข้า
	ออก

รหัสสำหรับประเภทการเดินทาง	
1. เดิน	6. รถยนต์รับจ้าง
2. รถจักรยาน	7. รถจักรยานยนต์รับจ้าง
3. รถจักรยานยนต์	
4. รถยนต์	
5. รถโดยสารประจำทาง	

การรายงานจำนวนเงินที่จ่ายเป็นเงินสดหรือเป็นสิ่งของให้เป็นจำนวนเงินท้องถิ่น ถ้าไม่มีค่าใช้จ่ายให้กรอก 0

	ลำดับที่การรักษา	ชนิดการให้บริการ	การดูแล/บริการ					การเดินทางมารักษา (เที่ยวเดียว)				ค่าอาหาร (บาท)	ค่าที่พัก (บาท)	การสูญเสียโอกาสหารายได้		
			สถานบริการ	เวลารอตรวจ (นาที)	เวลาที่ตรวจ (นาที)	จ่ายเป็นเงินสด	จ่ายเป็นสิ่งของ	ชนิดของการเดินทาง	ระยะทาง (กิโลเมตร)	เวลาเดินทาง (นาที)	ค่าใช้จ่าย (บาท)			ทำงานได้เป็นเงิน 1. ใช่ 2. ไม่ใช่	ขาดรายได้ 1. ใช่ 2. ไม่ใช่	ขาดรายได้ (บาท)
			a	b	c	d	e	f	g	h	i	j	k	l	m	n
Q23001	1															
Q23002	2															
Q23003	3															
Q23004	4															

ส่วนที่ 4 ค่าใช้จ่ายที่เกิดขึ้นจากการติดตามดูแลผู้ป่วย (สมาชิกครัวเรือน/ผู้ติดตาม)

ID.....

รหัสสำหรับประเภทสมาชิกครัวเรือน/ผู้ติดตาม			
1. มารดา	2. บิดา	3. พี่น้อง	4. เพื่อน
5. แฟน/คู่รัก	6. คู่สมรส	7. อื่น	

เพศ
1. ชาย
2. หญิง

การศึกษาสูงสุด
1. ไม่ได้ศึกษา
2. ชั้นประถม
3. ชั้นมัธยมต้น
4. ชั้นมัธยมปลาย/ปวส./ปวช.
5. ปริญญาตรีหรือสูงกว่า

รหัสสำหรับประเภทการเดินทาง	
1. เดิน	6. รถยนต์รับจ้าง
2. รถจักรยาน	7. รถจักรยานยนต์รับจ้าง
3. รถจักรยานยนต์	
4. รถยนต์	
5. รถโดยสารประจำทาง	

	ลำดับ	ประเภทของผู้ติดตาม	เพศ	อายุ (ปี)	ระดับการศึกษาสูงสุด	การเดินทางของผู้ติดตาม: ชนิดของการเดินทาง	การเดินทางของผู้ติดตาม: ระยะทาง (กิโลเมตร)	การเดินทางของผู้ติดตาม: เวลาเดินทาง (นาที)	การเดินทางของผู้ติดตาม: ค่าใช้จ่าย (บาท)	ค่าอาหาร (บาท)	ค่าที่พัก (บาท)	กำลังศึกษา 1. ใช่ 2. ไม่ใช่	ขาดเรียนกี่วัน	ทำงานมีรายได้ 1. ใช่ 2. ไม่ใช่	ขาดรายได้ 1. ใช่ 2. ไม่ใช่	รายได้ที่สูญเสียไป (บาท)
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
Q24001	1															
Q24002	2															
Q24003	3															
Q24004	4															
Q24005	5															
Q24006	6															

ชุดที่ 3 แบบบันทึกคัดลอกแฟ้มประวัติ		**ID……**	
Q31001	วันที่ผู้ป่วยทราบว่าตนเองมีผลเลือดเอชไอวีเป็นบวก	….....(วัน/เดือน/ปี)	
Q31002	วันที่ผู้ป่วยเริ่มรับประทานยาต้านไวรัสเอดส์	….....(วัน/เดือน/ปี)	
Q31003	ระยะเวลาที่ผู้ป่วยได้รับประทานยาต้านไวรัสเอดส์	.....เดือน.....ปี (วันที่สัมภาษณ์ – วันที่ผู้ป่วยเริ่มรับประทานยาครั้งแรก)	
Q31004	การประเมินความร่วมมือในการรับประทานยาต้านไวรัสเอดส์ (Adherence) ด้วยวิธี VAS ตั้งแต่เริ่มรับยาต้านไวรัสเอดส์ในช่วง 6 เดือนแรก	Adherence =.....	
Q31005	CD4 แรกเริ่มก่อนรับประทานยาต้านไวรัสเอดส์ (1st CD4)	….....เซลล์ต่อลูกบาศก์มิลลิเมตร	
Q31006	CD4 หลังจากรับประทานยาต้านไวรัสเอดส์ เป็นเวลา 6 เดือน (CD4 at 6 m.)	….....เซลล์ต่อลูกบาศก์มิลลิเมตร	
Q31007	ร้อยละของ CD4 ที่เพิ่มขึ้นเมื่อเทียบกับ CD4 เมื่อรับประทานยา เป็นเวลา 6 เดือน	$\frac{\text{CD4 at 6 m.} - 1^{st}\text{ CD4}}{1^{st}\text{ CD4}} \times 100$ เท่ากับร้อยละ.....	
Q31008	ผู้ป่วยมีประสบการณ์ในการเกิดโรคแทรกซ้อน<u>ก่อน</u>รับประทานยาต้านไวรัส หรือไม่	☐ 0. ไม่เคย ☐ 1. PCP ☐ 2. Candidiasis ☐ 3. TB ☐ 4. MAC ☐ 5. Penicillosis ☐ 6. Cryptomeningitis ☐ 7. อื่นๆ.....	
Q31009	ผู้ป่วยมีประวัติในการเกิดโรคแทรกซ้อน<u>หลัง</u>รับประทานยาต้านไวรัส หรือไม่	☐ 0. ไม่เคย ☐ 1. PCP ☐ 2. Candidiasis ☐ 3. TB ☐ 4. MAC ☐ 5. Penicillosis ☐ 6. Cryptomeningitis ☐ 7. อื่น ๆ.....	
Q31010	ผู้ป่วยมีประวัติในการเกิดผลข้างเคียงจากการรับประทานยาต้านไวรัส หรือไม่	☐ 0. ไม่เคย ☐ 1. Lipodystrophy ☐ 2. Periperal neuropathy ☐ 3. อื่นๆ (Q31010a).....	
Q31011	ผู้ป่วยมีประวัติในการดื้อยาต้านไวรัส หรือไม่	☐ 0. ไม่เคย ☐ 1. เคย	

Q31012	ผู้ป่วยเคยมารับการรักษาในแผนกผู้ป่วยในหรือไม่ ในโรงพยาบาลเชียงรายประชานุเคราะห์ และ ตึกผู้ป่วยอะไร (ในรอบปีงบประมาณ พ.ศ. 2551 : 1 ตุลาคม 2550 – 30 กันยายน 2551)	☐ 0. ไม่เคย ☐ 1. เคย.....ครั้ง ในตึกผู้ป่วย..... ☐ 2. ไม่แน่ใจ	

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