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# The Mounting Medical Care Cost for Adult AIDS Patients at the Faculty of Medicine, Siriraj Hospital : Consideration for Management

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SURAPOL SUWANAGOOL, M.D.\*,  
WINAI RATANASUWAN, M.D.\*,  
WICHAI TECHASATHIT, M.D.\*

## Abstract

From January 1993 to December 1995, case records of adult AIDS and HIV symptomatic patients admitted in the Department of Medicine, observation room and HIV Counseling Clinic were reviewed for the medical care cost of the patients based on the 1995 value of the Thai baht. In the three years, a total of 196, 227 and 182 adult AIDS case were admitted as in-patients respectively. The median duration of admission was 14 days. The leading causes of admission were tuberculosis, cryptococcal meningitis, *Pneumocystis carinii* pneumonia, diarrhea, salmonellosis and toxoplasmosis. An increase in the number of AIDS patients in the observation room was observed : from 572 cases in 1993 to 1,205 cases in 1995. In addition, approximately 600 AIDS cases were followed up at four to eight week intervals. The analysis of the data found an average medical care cost for hospitalized patients to be 1,452 baht per day while in the observation room it was 1,509 baht per day and 1,132 baht per month for the patients attending the HIV and Counseling Clinic. Because of the higher number of cases and the limited number of admission beds, only 15 per cent of AIDS patients in the observation room could be admitted as hospitalized patients. At present, it is urgent that a referral network be established among all university hospitals, all government hospitals and health centers. In this way, the more advanced medical facilities can serve as a primary diagnostic center which can refer patients for care and follow-up based on an established referral system. In addition, the development of a hospice service and community care is needed for cases in the terminal stage of the illness.

HIV infection/AIDS has become a major public health and social challenge for many countries including Thailand. Since 1990, the epidemic of HIV infection in Thailand has been primarily driven by sexual intercourse with multiple partners. The commercial sex workers and male clients carry

the virus to non-commercial partners and their infants<sup>(1,2)</sup>. Since the first recorded Thai case in 1984, through January 1997 the number of accumulated AIDS patients total 55,443 persons in addition to 23,163 symptomatic HIV patients. Over 50 per cent of these cases emerged only in the last

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\* Department of Preventive and Social Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

4 years. By occupation, most patients are laborers, farmers, wage workers and others of low socio economic status<sup>(3)</sup>.

Accordingly many symptomatic patients seek medical care from large government hospitals and usually appear when the disease has progressed to full blown AIDS or at an advanced stage. Only a limited number of in-patient beds at Siriraj Hospital are available to admit AIDS patients but the medical care cost to the patient is less expensive compared to the private sector. Especially for a teaching institution such as Siriraj Hospital it is imperative to allow for a range of competitive medical conditions of both infectious, non-infectious disease and others as well.

The number of AIDS patients appearing at Siriraj Hospital has increased steadily over the past 3-4 years<sup>(4)</sup>. Due to the expense in treating a complex range of infectious disease complications (especially opportunistic infections), the medical care cost of each case is increasing commensurately and may soon become an unmanageable burden. In addition, the associated costs for universal precautions techniques (antiseptics, gloves, gowns, masks, disposable syringes, needles, etc.) and HIV laboratory testing increase accordingly.

The purpose of this paper, is to report on a study to determine the medical care cost of AIDS patients at Siriraj Hospital and evaluate which factors are the more important cost determinants. The paper concludes with case management recommendations in order to increase the benefit for AIDS patients and their families.

## MATERIAL AND METHOD

From January 1993 through December 1995, each case record of adult AIDS and HIV symptomatic patients admitted in the Department of Medicine, observation room and the HIV and Counseling Clinic (operated by the Department of Preventive and Social Medicine) were reviewed by at least two of the authors. The definition of AIDS and symptomatic HIV patients were made according to the criteria of the Thailand Ministry of Public Health and the Center for Disease Control, U.S.A<sup>(5,6)</sup>. The demographic characteristics, duration of hospitalization, distribution of illnesses and outcome were included in the analysis. The medical care cost of the patients (In-patient, observation room, HIV clinic) include medication cost, laboratory test, X-ray, ultrasound, computerized study and diagnostic procedures (i.e. Bronchoscope, Endoscope, Biopsy) based on the 1995 value of the Thai baht. Most of the antiretroviral medications used in the HIV and Counseling Clinic were provided by the AIDS Division, Department of Communicable Disease, Ministry of Public Health, Thailand and, thus, their cost is not included in this analysis.

## RESULTS

In the three years spanning January 1993 - December 1995, a total of 196, 227, and 182 adult AIDS cases respectively were admitted to the medical ward as in-patients. Most cases were males who resided in Bangkok or provinces of the central region of Thailand (Table 1). The majority of

**Table 1. Demographic characteristics of AIDS patients : 1993 - 1995.**

	1993	%	1994	%	1995	%
Number (cases)	196		227		182	
Sex : male	159	81.1	192	84.6	148	81.3
female	37	18.9	35	15.4	34	18.7
Age : range (years)	13-67		13-64		15-70	
mean $\pm$ S.D.(years)	33.6 $\pm$ 10.7		34.0 $\pm$ 9.4		32.7 $\pm$ 11.4	
Residence :						
Bangkok	100	51.0	146	64.3	122	67.0
Central provinces of Thailand	29	14.8	51	22.5	30	16.5
Northern provinces of Thailand	11	5.6	10	4.4	11	6.0
Southern provinces of Thailand	6	3.1	4	1.8	2	1.1
Northeastern provinces of Thailand	7	3.6	12	5.3	9	4.9
Eastern provinces of Thailand	5	2.6	-		2	1.1
Unknown	38	19.4	4	1.8	6	3.3

**Table 2. CD<sub>4</sub> + T lymphocytes count in AIDS patients : 1993 - 1995.**

CD <sub>4</sub> + T lymphocyte count (cells/mm <sup>3</sup> )	1993		1994		1995	
Range	4-990		1-1420		5-1213	
Median	71		64.5		43.5	
	Number per cent (n=121)		Number per cent (n=114)		Number per cent (n=88)	
<50	50	41.3	45	39.5	48	54
51-100	23	19.0	29	25.4	14	15
101-200	19	15.7	17	14.9	5	5
>200	29	24.0	23	20.2	21	23
N.B. CD <sub>4</sub> range (1993-1995) range 1 - 1420 (n = 323) mean $\pm$ S.D. = 142.7 $\pm$ 198.9 cells/mm <sup>3</sup> Median = 59 cells/mm <sup>3</sup>						

**Table 3. Duration of admission and outcome among AIDS patients during 1993-1995.**

Hospitalization	1993 (n = 196)	1994 (n = 227)	1995 (n = 182)
Range of admission (days)	1-89	1-64	1-87
Median (days)	11	14	14
Mean $\pm$ S.D. (days)	16.3 $\pm$ 14.4	16.8 $\pm$ 13.7	16.2 $\pm$ 12.1
Total hospitalization days	3,192	3,816	2,942
Per cent of occupied beds	5.8%	7.0%	5.4%
Outcome : survived	130 (66.3%)	157 (69.2%)	134 (73.6%)
deceased	66 (33.7%)	70 (30.8%)	48 (26.4%)

cases were of low socioeconomic status with Karnofsky performance scale measurements of less than 50<sup>(7)</sup>. The median CD<sub>4</sub> lymphocyte count was 59 cells/mm<sup>3</sup> (n = 323). (Table 2)

The median duration of admission was 14 days and the AIDS patients occupied 5.4-7.0 per cent of in-patient admission beds of the Department of Medicine. From 17.6 per cent to 18.8 per cent of the patients were admitted two or more times in each year. Overall, 26.4-33.7 per cent died before discharge (Table 3). The leading cause of admission was tuberculosis cryptococcal meningitis, pneumocystis carinii pneumonia, diarrhea, salmonellosis and toxoplasmosis (Table 4).

For AIDS patients admitted to the observation room (2-5 days), an increasing trend has been observed from 572 cases in 1993 to 1,205 cases in

1995. In addition, in the first half of 1996 more than 600 cases have been processed. Almost all AIDS patients who contact Siriraj Hospital qualify for admission. However, because of the limited number of admission beds and because of the need to share with other medical divisions, only 15 per cent of AIDS patients in the observation room could be admitted to the hospital in 1995. In addition, approximately 600 AIDS cases each year from 1993 to 1995 were followed-up regularly at four to eight week intervals, primarily for continuing treatment of infectious disease complication or opportunistic infections such as tuberculosis, cryptococcosis, pneumocystosis, etc.

The medical cost of diagnosis and treatment based on the 1995 baht value is shown in Table 5. The analysis of the data found the average

Table 4. Distribution of illnesses among adult AIDS patients : 1993 - 1995.

Illnesses	1993 (n = 196)	1994 (n = 227)	1995 (n = 182)
Oral candidiasis	88	72	85
Candida esophagitis	14	11	9
Tuberculosis*	59	85	46
Pulmonary	37	58	24
Extrapulmonary	35	44	25
Pulm & extrapulm	13	17	3
Cryptococcal meningitis*	51	61	48
<i>Pneumocystis carinii</i> pneumonia*	37	29	30
Salmonellosis*	13	7	5
Toxoplasmosis*	7	6	7
Penicilliosis*	9	1	2
Bacterial pneumonia	8	17	9
Bacteremia	3	0	1
F.U.O.	6	5	3
HSV	13	5	3
HZV	4	3	6
CMV (retinitis, colitis)	3	2	2
Diarrhea* :			
<i>Cryptosporidium</i>	9	2	7
<i>Isospora</i>	4	0	0
Unknown etiology	11	13	7
Histoplasmosis	1	1	0
Pulmonary Nocardiosis	1	1	1
Lymphoma	1	2	2
Kaposi's sarcoma	0	0	1

\*The leading causes of admission

medical care cost for hospitalized patients was 1,452 baht/day/patient or 15,975 to 20,332 baht/patient/admission (range from 11 to 14 days admission). For those AIDS patients seen in the observation room the medical care cost equalled 1,509 baht/day or 3,018 to 4,527 baht/patient (range from 2 to 3 days in an observation room). The medical care cost of AIDS patients attending the HIV and Counselling Clinic on average was 1,132 baht/month/patient. Additional data provided by the Director of Siriraj Hospital on the cost of an appropriate barrier for health care workers used for universal precautions at work, the cost of disposable syringes, needles and the cost of various related HIV laboratory tests is increasing annually as

shown in Table 6.

In order to determine factors affecting the medical expense of hospitalized patients from January 1993 to December 1995 all variables including age, CD<sub>4</sub> lymphocyte count, duration of hospitalization, number of admissions and all disease diagnoses during admission were analysed by using forward, stepwise multiple linear regression. The variables which are significantly associated with medical expenses include pneumocystis carinii pneumonia, duration of admission, tuberculosis pleuritis, number of admissions, tuberculous lymphadenitis, herpes zoster, herpes simplex infection and cryptococcal meningitis. These factors can be summarized into the following equation.

$$\text{cost (baht/admission)} = 2401.5 + 3123.1 (\textit{Pneumocystis carinii} \text{ pneumonia}) + 644.9 (\text{days of admission}) - 2335.9 (\text{tuberculosis pleura}) - 351.9 (\text{number of admission}) - 2006.2 (\text{tuberculosis of lymph node}) + 6317.5 (\text{herpes zoster virus infection}) + 2683.8 (\text{herpes simplex virus infection}) + 4705.7 (\text{cryptococcal meningitis})$$

**Table 5. The medical care cost of management for adults AIDS patients (based on 1995 baht value).**

I. Bed, meals	200 Baht/day	(observation room)
II. Laboratory test, Procedures :		
- CBC, urine analysis	100 Baht	
- Electrolyte	150 Baht	
- Liver function test	300 Baht	
- Sputum exam, culture for AFB	500 Baht	
- Hemoculture	300 Baht	
- CSF exam, culture, serology	600 Baht	
- Chest X-ray	150 Baht	
- Ultrasound	800 Baht	
- CT-Brain, abdomen	4,000-5,000 Baht	
- Arterial blood gas	200 Baht	
- Biopsy specimen & histopathology examination	1,000 Baht	
- Bronchoscope, endoscope, proctosigmoidoscope	1,000 Baht	
III. Medication for infectious disease		
- Cryptococcosis (Fluconazole, Amphotericin B)		400-600 Baht/day
- Pneumocystosis (TMP-SMX, PO, I.V.)		50-500 Baht/day
- Salmonellosis (PO, I.V.)		50-500 Baht/day
- Tuberculosis		30 Baht/day
- Toxoplasmosis (PO, I.V.)		30-2,400 Baht/day
- Oral candidosis		10-150 Baht/day
- HSV, HZV (Acyclovir)		250-2,000 Baht/day
- Cytomegalovirus (Gonciclovir)		4,000 Baht/day
IV. Miscellaneous		
- Oxygenation		300 Baht/day
- Respirator		1,000 Baht/day
- I.V. set, fluid		100 Baht/ 1,000 ml
- Soluset		110 Baht/day

Taken together, the average combined medical care cost of all adult AIDS patients/year at Siriraj Hospital has increased from 18,726,176 baht in 1993 to 26,812,204 baht in 1995 (Table 6). The most significant increased cost for medication is for cryptococcosis from 65,000 to 150,000 baht/year/patient.

This cost analysis omits labour cost, social welfare payments and other routine service costs. If these costs are included, as they are in the private hospital setting, then the total AIDS patient cost would be considerably higher.

## DISCUSSION

Approximately one-fifth of AIDS and symptomatic HIV patients live in Bangkok, and the central provinces of Thailand<sup>(3)</sup>. The majority of patients are of low socio-economic status and lack formal medical care when they are seriously ill. Due to their low income, many patients seek care from government hospitals. Siriraj Hospital of Mahidol University is a government medical school. It is the largest hospital in Thailand and has about 2,000

service beds of which approximately 200 beds belong to the medicine service. Each day there are three to eight adult AIDS patients on stretchers in the observation rooms waiting for admission. Only 15-20 per cent are ultimately admitted for care. The limitation on AIDS admissions is primarily due to the need to offer a range of care covering the full spectrum of infectious and non-infectious diseases as well as other conditions in this university hospital.

Siriraj Hospital is a teaching hospital and has more facilities for thorough diagnosis of most AIDS-related conditions. Therefore, Siriraj Hospital is more appropriate to serve as a diagnostic center and referral nexus for other hospitals and health centers which can provide further management and follow-up. While reducing the heavy and increasing caseload burden on Siriraj Hospital, such a strategy would give medical practitioners of other facilities more skill and familiarity with HIV medicine. Siriraj Hospital may best serve as a referral center for complicated cases or for accurate diagnosis to be confirmed.

Table 6. The medical care cost of adult AIDS patients at Siriraj Hospital during 1993 - 1995.

	1993			1994			1995		
	No.	Median (days)	Baht	No.	Median (days)	Baht	No.	Median (days)	Baht*
Hospitalization patients (1,452 baht/day/patient)	196	11	3,131,180	227	14	4,615,441	182	14	3,700,486
Observation patient (1,509 baht/day/patient)	572	2	1,725,884	753	3	3,408,018	1,205	3	5,453,734
HIV clinic									
- AIDS patient (1,132 baht/month/patient)	516	-	7,012,316	578	-	7,854,881	679	-	9,227,447
Cost of CD <sub>4</sub> + T lymphocytes measurement, HIV serology**	-	-	1,520,000	-	-	1,820,001	-	-	2,210,000
Cost of universal precautions preparation**	-	-	4,450,000	-	-	5,100,001	-	-	5,408,000
Total	-	-	18,726,176	-	-	24,394,224	-	-	26,812,204

N.B. Not including cost of antiretroviral drugs, medical care cost of patients in Department of Pediatrics, Ob-Gyn.

\* Twenty-five baht = one dollar

\*\* Information provided by Dr. Phisit Chirawong, Director of Siriraj Hospital, Dr. Tararaj Dharakul, Department of Immunology and Dr. Ruengpung Suththent, Department of Microbiology.

A study conducted by the Ministry of Public Health of 26 provincial hospitals found that the average medical care cost/patient in 1992 equalled 605.21 baht/day or 4236.50 baht per admission (median admission = 7 days)<sup>(8)</sup>. In addition Viravaidya M, Obremskey SA and Myers C have estimated the direct medical care cost (cost of diagnosis and treatment) of in-patient AIDS in Thailand in 1995 was low and high scenarios of \$22.66-28.19 per day (or Baht 566.5-704.8) with patient days per episode ranging from 13-16 days<sup>(9)</sup>. This projected cost is distinctly lower from the average per patient medical care cost in 1993-1995 at Siriraj Hospital of 1,452 baht per day. One explanation for this large discrepancy is the more advanced laboratory and diagnostic procedures currently used at Siriraj Hospital. In addition, Siriraj Hospital has a wider range of therapeutic drugs to treat the range of opportunistic infections and this increases the cost per patient. Although not measured in this study, it is also probable that the cost per in-patient will increase over time until the more sophisticated multi-drug HIV treatments are used more widely.

As shown by the equation in the previous section, factors with positive coefficients increase cost of hospital expense from a baseline of 2401.5 baht, such as days of admission, herpes simplex, herpes zoster and cryptococcal meningitis. Herpes simplex, herpes zoster, cryptococcal meningitis, and pneumocystis carinii pneumonia have positive coefficients because acyclovir medication for herpes infection therapy is very expensive and hospitalized cryptococcal meningitis and pneumocystis carinii pneumonia patients need intravenous medication that is also very expensive. Factors with negative coefficients mean these decrease the cost of hospital expenses from the baseline (2401.5 baht), such as tuberculosis of the lymph node, tuberculosis pleura and number of admissions. Tuberculosis of the lymph node and tuberculosis pleura have negative coefficients because medica-

tion for tuberculosis are orally administered and are inexpensive compared to medications for other opportunistic infections. The reasons why the number of admissions has a negative coefficient may be the difference in severity of disease among patients with a different number of admissions. From this study, we found that the mortality of patients with first admission is higher than the mortality of in patients with more than one admission. It can be hypothesized that the first-admission patients came to the hospital with a more severe stage of disease than patients with more than one admission.

The increasing number of AIDS patients each year raises serious concerns of an impending care crisis, unless something is done soon. It is urgent that the concept of a referral network be established in the university hospitals, all government hospitals and health centers. In this way the more advanced medical facilities in university hospitals and regional hospitals can serve as a primary diagnostic center which can refer patients for standard care and follow-up based on an established referral system. In addition, the more rapid development of hospice services and community care is needed for cases in the terminal stage of illness, as nearly one-third of Siriraj AIDS admissions are. These measures are an interim approach since it can be projected that the AIDS caseload will peak and decline as forecasted by trends among national surveys of 21 year-old men and pregnant women<sup>(3,10,11)</sup>. However, the trend in AIDS patient caseloads will take at least another decade to unfold. In the meantime, action is needed now.

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## การเพิ่มของต้นทุนในการให้บริการทางการแพทย์ของผู้ป่วยเอดส์ที่โรงพยาบาลศิริราช: ความจำเป็นในการพิจารณาการบริหารจัดการ

สุรพล สุวรรณกุล, พ.บ.\*,

วินัย รัตนสุวรรณ, พ.บ.\*, วิชัย เตชะสาธิต, พ.บ.\*

ในระหว่างเดือนมกราคม 2536 ถึงเดือนธันวาคม 2538 ผู้รายงานและคณะ ได้ศึกษาต้นทุนการให้บริการทางการแพทย์แก่ผู้ป่วยเอดส์ที่รับไว้รักษาที่โรงพยาบาลศิริราช ในหอผู้ป่วยภาควิชาอายุรศาสตร์ จำนวน 196, 227, 182 ราย ตามลำดับ, ผู้ป่วยที่รับไว้ในห้องเฝ้าดูอาการซึ่งเพิ่มจาก 572 รายต่อปีในปี 2536 ถึง 1,205 รายในปี 2538 และผู้ป่วยที่รักษาที่คลินิกโรคติดเชื้อและภูมิคุ้มกันบกพร่องจำนวน 516-679 รายต่อปี โดยคิดราคาค่าของบริการดูแลรักษาตามราคาของปี 2538 พบว่าต้นทุนการให้บริการทางการแพทย์ (ค่ายา, เวชภัณฑ์, การตรวจทางห้องปฏิบัติการและการตรวจเพื่อวินิจฉัย ยกเว้นค่ายาต้านเอชไอวี ซึ่งได้รับการสนับสนุนจากกรมควบคุมโรคติดต่อ) เฉลี่ยต่อวันเท่ากับ 1,452 บาทของผู้ป่วยใน (ค่ามัธยฐานจำนวนวันที่รับไว้รักษาในโรงพยาบาล 11-14 วัน), ของผู้ป่วยที่รับไว้ในห้องเฝ้าดูอาการ 1,509 บาทต่อวัน (เป็นเวลา 2-3 วัน) และของผู้ป่วยที่ติดตามรักษาที่คลินิกโรคติดเชื้อเฉลี่ย 1,132 บาทต่อเดือน โดยพบว่าโรคติดเชื้อแทรกซ้อน เช่น วัณโรค, เยื่อหุ้มสมองและไขสันหลังอักเสบจากเชื้อ *Cryptococcus*, ปอดอักเสบจาก *Pneumocystis carinii*, อูจจาระร่วง, สมออักเสบจาก *Toxoplasma gondii* เป็นสาเหตุสำคัญที่ทำให้ผู้ป่วยถูกปรับไว้รักษาในโรงพยาบาล ในสถานการณ์ปัจจุบันที่มีจำนวนผู้ป่วยเอดส์เพิ่มขึ้นเป็นจำนวนมากในห้องเฝ้าดูอาการ ห้องฉุกเฉิน จึงมีความจำเป็นที่จะต้องมีการสร้างเครือข่ายการให้บริการทางการแพทย์ในโรงพยาบาลของรัฐ, ศูนย์บริการสาธารณสุข ทุกระดับ เพื่อให้โรงพยาบาลของมหาวิทยาลัย, โรงพยาบาลของรัฐขนาดใหญ่ เป็นสถานที่ซึ่งทำการวินิจฉัยและรักษาในเบื้องต้น และมีเครือข่ายที่สามารถส่งผู้ป่วยต่อไปยังสถานบริการทางการแพทย์ในระดับต่างๆ เพื่อที่จะได้ติดตามและดูแลรักษาต่อไป ตลอดจนให้มีการพัฒนาการดูแลในชุมชน, hospice อย่างมีประสิทธิภาพ จนกว่าจำนวนผู้ติดเชื้อเอชไอวีใหม่จะลดลงอย่างชัดเจนในอนาคต

\* ภาควิชาเวชศาสตร์ป้องกันและสังคม, คณะแพทยศาสตร์ศิริราชพยาบาล, มหาวิทยาลัยมหิดล, กรุงเทพฯ 10700