ต้นทุนการรักษาผู้ป่วยโรคจิตเภทแบบผู้ป่วยในของโรงพยาบาลจิตเวชขอนแก่นราชนครินทร์แห่งประเทศไทย

วาทินี สุขมาก, จารี ทองคำ***

บทคัดย่อ

วัตถุประสงค์ เพื่อวิเคราะห์ต้นทุนทางตรงของรักษาผู้ป่วยโรคจิตเภทแบบผู้ป่วยในของประเทศไทยช่วงเวลา 3 ปี

วิธีการ เป็นศึกษาจากฐานข้อมูลผู้ป่วยโรคจิตเภทที่นอนรักษาในโรงพยาบาลจิตเวชขอนแก่นราชนครินทร์ ระหว่างวันที่ 1 มกราคม 2553 ถึง 31 ธันวาคม 2556 ประกอบด้วย ข้อมูลเกี่ยวกับอายุ เพศ การศึกษา สถานภาพสมรส จำนวนภาวะโรคร่วม ระบบการจ่ายค่ารักษาพยาบาล ระยะเวลาในโรงพยาบาลและองค์ประกอบของต้นทุนทางตรง วิเคราะห์สถิติด้วย generalized linear model with a log link function and gamma distribution เพื่อดูการทำนายต้นทุนโดยรวมในโรงพยาบาล

ผลการศึกษา ต้นทุนทางตรงของการรักษาผู้ป่วยโรคจิตเภทแบบผู้ป่วยในโดยเฉลี่ยประมาณ 20,157.10 บาทต่อครั้งในช่วงเวลา 3 ปี แบ่งเป็นต้นทุนสูงสุดจากค่าเตียงคิดเป็นร้อยละ 40.78 รองมาคือ ค่าบริการทางการแพทย์คิดเป็นร้อยละ 39.59 ต้นทุนทั้งหมดต่อการนอนรักษาในโรงพยาบาลมีค่าสูงสุดในผู้ป่วยที่พยายามฆ่าตัวตาย คิดเป็น 31,888.48 บาท ค่าต่ำสุดในผู้ป่วยประกันสังคม คิดเป็น 11,014.85 บาท ปัจจัยที่สัมพันธ์กับต้นทุนการรักษา คือ เพศ อายุ ระบบการจ่ายและพฤติกรรมที่ต้องเฝ้าระวัง

สรุป ขอค้นพบนี้ช่วยให้เห็นปัจจัยที่อาจช่วยลดต้นทุนและช่วยวางแผนในระบบบริการสุขภาพ

คำสำคัญ โรคจิตเภท, ผู้ป่วยใน, ต้นทุน

วารสารสมาคมจิตแพทย์แห่งประเทศไทย 2556; 58(4): 421-432

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Costs of Inpatient Care for Schizophrenia at Khon Kaen Rajanagarindra Psychiatric Hospital

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ABSTRACT

Objective : To analyze the direct costs of inpatient care for schizophrenia in Thailand over a 3-year period.

Methods : Computerized data for schizophrenia patients were obtained from Khon Kaen Rajanagarindra Psychiatric Hospital between 1 January 2010 and 31 December 2012 with information on age, gender, education, marital status, number of co-morbidities, type of payment schemes, length of hospital stay and components of direct cost. A generalized linear model with a log link function and gamma distribution was used to determine the predictors of total hospital cost.

Results : The average direct cost of schizophrenia inpatient care was estimated at 20,157.10 Baht per admission over a 3-year period. Hospital bed (40.78%) and inpatient care service/physician fee (39.56%) constituted the highest cost. The total costs per admission were highest in patients who had made a suicide attempted (31,888.48 Baht) and lowest (11,014.85 Baht) for schizophrenia patients under the social security scheme.Factors associated with the total direct cost for inpatient schizophrenia were gender, age, type of payment scheme and behavior under surveillance.

Conclusion : These findings suggest which factors could be focused on to reduce admission costs and to assist in health services planning.

Keywords : Schizophrenia, inpatient, cost

J Psychiatr Assoc Thailand 2013; 58(4): 421-432

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Introduction

Schizophrenia is one of the most severe and disabling mental illness. It, therefore, places a heavy burden on individuals and their care-givers, as well as potentially large demands on the healthcare system. In 1990, WHO ranked schizophrenia as the ninth leading cause of disability among all diseases worldwide[1]. In Thailand, the incidence rate of schizophrenia was 0.3 per 1000, with a peak at ages 15-24 years old in both male and females[2]. It is also the highest patients admitted to mental health hospitals (59%)[3]. The impact of schizophrenia on health care budgets is substantial, typically around 2.8% ($65 billion) of all attributable National Health Service (NHS) and social services expenditures in the United States[4]and between 1.5% and 3% of total national health care expenditures in developed countries[5].

A number of studies have been conducted to estimate different cost items attributable to schizophrenia and its management because inpatient hospital care is the major contributor to the health care costs of schizophrenia[6-9]. However, the proportion of costs attributed to inpatient care varies from country to country, depending on the organization of mental health services, the purpose and perspective of analyses, yielding different results. For example, in the United States and several European countries, it has been estimated that inpatient cost of schizophrenia involves between one- and two-thirds of the total health care cost of schizophrenia[4] and the amount of direct medical cost was approximately $US4,100 per patient per year[10].Furthermore, it has been estimated the average cost per admission for caring schizophrenic patients in community psychiatric services of Italy about ITL 4,968,000 (350,000-21,000,000)[11] and the mean direct cost per year was $US24,108[7]. In Taiwan, schizophrenia accounted for 1.2% of national health care expenditures[12]. In addition, Zhu et al.[13] found that the two largest costs for inpatient care for schizophrenia were psychotropic medication (30%) and hospitalization (29%)whereas Lanand Su[7] found that medication costs accounted for only 10.5% of total inpatient cost per admission.

Some studies were performed to examine factors influencing treatment costs. For instance, findings from previous research have revealed that annual mental treatment costs of people with schizophrenia was significantly affected by factors of attempted suicide, prior arrest and violent behavioral experienced[13]. Moreover, Zeidler et al.[14] reported that female schizophrenic patients and being co-morbid with substance abuse were predictors for a higher probability of hospital treatments. However, factors influencing total cost of treatments can vary from country to country and even from hospital to hospital. This observation can be attributed in part to variations in healthcare financing systems, differences in clinical practices and in study design.

In Thailand,it has been estimated that the total health budget reached 3.9 percent of gross domestic in 2002[15] before falling to 3.5-3.6 percent during 2003 to 2007[16]. In 2011 the government has been spending up to 200 billion Baht per year,

growing at the same rate of 3.9 percent observed in 2010[17]. In 2012 and 2013, health spending is projected to continue to grow modestly at 4.2 percent and 3.8 percent, respectively[18].In spite of this, the government spent only 3.0% of health expenditure to mental health[19].Of this 3.0% health expenditure to mental health, 31,000 million Baht (USD 925 million) was account for the entire population with schizophrenia[20].It has been estimated that the unit costs per admission for schizophrenia at the Ramathibodi hospital, faculty of medicine were about 56,388.44 Baht[21]whereas Phuaphanprasert and Pannarunothai[22] reported the unit costs per admission at SuanPrung psychiatric hospitalswere around 20,766 Baht. Also, in Phanthunane et al.,[23]cross-sectional survey, it has been found that the annual cost of schizophrenia was estimated to be 87,000 Baht per person.

To date, the trends of psychiatric inpatient services have changed due to the political policy of de-institutionalization. Thailand has developed a new budgetary resources allocation system for public health finance through capitation payments for out-patient groups and Diagnosis Related Groups (DRG) relative weight, to purchase inpatient care for in-patient groups. The unit cost one schizophrenia patient per admission regarding the DRG that allocated to the contracting units for primary care by National Health Security Office (NHSO key purchaser) was about 15,027.67 Baht. As reimbursements based on the constant rate and relative weight of DRG, the difference of the cost of service provision for schizophrenia ranged from 5,738.33 to 41,360.77 Baht per admission. Therefore,several psychiatric hospitals decreased the number of patients and decreased the length of stay for inpatients[24]

Although schizophrenia is a costly disorder, research on the costs of inpatient care for schizophrenia in Thailand is still scare. The objectiveof the current study, therefore,was to assess the actual direct costs of inpatient care and to determine their possible influencing factors of inpatient cost on schizophrenia in the northeast region of Thailand over a 3-year period. It is expected that this analysis will provide an understanding in formulating reimbursement policies and sufficient incentive in regard to treating high cost schizophrenic patients.

Methods

This study utilized the existing data from the Khon Kaen Rajanagarindra Psychiatric Hospital's internal database. This is a large database of psychiatric patients in the northeast of Thailand amassed during a three year period between January 1, 2010 and December 31, 2012.

The study has been approved by the human subjects committee of Mahasarakham University and with the permission of the hospital's review board provided the authors maintain the confidentiality of data retrieved from clinical records. Therefore, the identity of the patients has been de-identified by removal of all Protected Health Information. The data also underwent several

stages of quality checks to delete duplicate records and correct errant variable coding. Inpatient records of all admissions and discharges of inpatients with a primary diagnosis of schizophrenic disorder (ICD-10 diagnosis code F20) diagnosed by an experienced psychiatrist were identified and retrieved from the IT department.

The Hospital. The Khon Kaen Rajanagarindra Psychiatric Hospital is a 372-bed tertiary health institution located in the northeast of Thailand. It, one of seventeen mental hospitals, belongs to the Thai Department of Mental Health under the Public Health Ministry. It provides health service and takes referrals from 5 provinces in the Northeastern Region.

Study sample. The original dataset contained 4,031 cases. The authors excluded 13 cases because of no information on patient costs and 16 cases had a length of hospital stay of less than one day. The remaining sample 4,002 schizophrenic cases (99.28% of the original study sample) was used for analyzing direct costs of treating schizophrenia. Information on the socio-demographic (age, gender, marital status, education and occupation), clinical characteristics (diagnoses, behaviors under surveillance, comorbidity illnesses, length of stay and types of payment scheme)was extracted from the case files. Missing data for education (13.8%) and occupation (0.0002%) was included in analyses using a missing indicator variable.

Length of stay (LOS) was the number of days from the date of admission to the date of discharge from the hospital, and at least 1 day separating the discharge date from an admission date. Psychiatric comorbidities were divided into three categories: sole schizophrenia, with one psychiatric comorbidity illness, and with more than one psychiatric comorbidity illness. Behaviors under surveillance were divided into four categories: suicide attempts, accidental prone, violent behavior, and hospital escape. Types of payment scheme were classified according to four different health insurance schemes: universal coverage scheme, civil servant medical benefit scheme and social security scheme as well as self-payment.

Cost Estimates. Actual costincurred from each hospitalization was extracted from the financial database for the list of patients extracted using ICD 10 codes. Direct costs included cost of resources utilized and services received. The total direct costs were calculated as the sum of the following component costs: hospital bed, inpatient general services, medication cost, activity group therapy, behavioral therapy, psychotherapy, laboratory test, emergency services, nursing services, electroconvulsive therapy (ECT), radiological test, electrocardiography (EKG), electroencephalography(EEG), psychological test, physical therapy and dental service. All costs were calculated in Thai currency (Baht) on the basis of fees, rates and prices. The average annual exchange rate of one US dollar to Thai Baht was 32.19, 29.92 and 30.72 Baht in 2010, 2011 and 2012, respectively.

Data Analysis. Data-mining and processing was conducted using the Microsoft SQL Server. Data in the text and table are illustrated as mean and standard deviation. Analyses were conducted using Statistical Package for Social Sciences SPSS (SPSS INc., Chicago, IL, USA). Categorical data were presented in frequency and percentage. Continuous data were presented in mean, minimum, maximum and standard deviation.The average cost for each component for patients admitted within each year was calculated. Then, the average total cost was calculated for each admission each year. The model estimated total costs of all admissions over the 3-year period using generalized linear model (GLM) assuming a gamma distribution to handle right skew in the data[25,26].A p value of $<$ 0.05 was defined statistically significant (two-tailed tests)

Results

The total sample used in the cost analysis comprised the 4,002 cases. Table 1 shows the mean, SD and range for demographic data, LOS, payment methods, number of comorbidities and behaviors under surveillance. The mean age of patients was 38.00, 38.16 and 37.40 years($\pm$9.02, $\pm$9.71 and $\pm$9.62) and the percentage of male patients was 78.80%, 77.16% and 75.23 % in 2010, 2011 and 2012, respectively. Approximately, 70% patients were unmarried. The majority of the patients (90%) were paid by universal coverage scheme and 10% by other insurance schemes. Patients had more violent behavior under surveillance than other behaviors. The average LOS was 40.46, 29.98 and 22.62 days while the median LOS was 29.00, 23.00 and 17.00 days in 2010, 2011 and 2012, respectively. As can be seen, mean LOS had been decreased dramatically.

Table 1 Demographic and clinical characteristics of patients (N=4002).

Characteristics	2010 (N=1205)		2011 (N=1388)		2012 (N=1409)	
	N	%	N	%	N	%
Gender						
Male	940	78.80	1,071	77.16	1,060	75.23
Female	265	22.01	317	22.83	349	24.77
Marital Status						
Single	853	70.54	973	70.10	977	69.34
Married	203	16.85	255	18.37	234	16.61
Divorced/separated	132	10.95	129	9.29	164	11.64
Widowed	8	0.66	17	1.25	19	1.35
Monk	9	0.75	14	1.01	15	1.06
Education Level						
Primary level	541	44.90	630	45.39	621	44.07
Secondary level	354	29.38	423	30.48	426	30.23
Occupational level	91	7.55	98	7.06	89	6.32
Higher level	50	4.15	61	4.39	64	4.54
Missing	169	14.02	176	12.68	209	14.83
Occupation						
Unemployed	398	33.03	447	32.20	440	31.23
Farmer	511	42.41	619	44.60	574	40.74
Worker	266	22.07	296	21.33	353	25.05
Civil Servant	30	2.50	25	1.80	42	2.98
Missing	-	-	1	0.00	-	-
Payment methods						
Self payment	53	4.40	33	2.38	20	1.49
Civil Servant Medical Benefit	44	3.65	47	3.39	58	4.16
Universal Coverage	1,094	90.79	1,258	90.63	1,288	91.41
Social Security	14	1.16	50	3.60	43	3.05
Number of Comorbidities						
0	904	75.02	963	69.38	1,068	75.80
1	242	20.08	323	23.27	262	18.59
2+	59	4.89	102	7.34	79	5.61
Behaviors under surveillance						
Suicide Attempts	19	1.57	25	1.80	4	0.28
Accident Prone	21	1.74	53	3.82	16	1.14
Violent Behavior	91	7.51	244	17.58	99	7.03
Hospital Escape	89	7.38	222	15.99	99	7.03
	Mean	SD	Mean	SD	Mean	SD
Age, years	38.00	9.02	38.16	9.71	37.40	9.62
Length of Stay, days	40.46	37.70	29.98	26.87	22.62	17.04

Table 2 displays mean, range, and standard deviation of the inpatient cost components per admission eachyear. The average total cost was 23,629.10, 20,226.90 and 17,119.00 Baht per admission each year, of which 40.78% (8,220 Baht) was for hospital bed,followed by inpatient care services/physician fee cost at 39.56% (7,974 Baht), and drug cost at 7.69% (1,550 Baht). The average total direct cost for each admission was 20,157.10 Baht (± 18,110.98) over the 3-year period.

Table 2 Mean, Range and Standard deviation of the total cost by cost components per admission.

Cost component	2010			2011			2012		
	Mean cost (Baht)	Range	SD	Mean cost (Baht)	Range	SD	Mean cost (Baht)	Range	SD
Hospital bed	9,608.55	300.00-75,600.00	8,707.93	8,243.48	300.00-103,200.00	8,112.00	7,009.55	300.00-46200.00	5,354.534
Inpatient care services/ physician fee	9,273.99	300-75,600.00	8,572.67	8,053.75	300.00-103,200.00	8,082.16	6,782.90	300.00-46,200.00	5,115.63
Medication	2,072.85	0.00-123,828.00	4,690.06	1,464.26	0.00-202,806.00	5,916.99	1,185.90.00	0.00-49,296.00	2678.09
Activities group therapy	602.12	0.00-12,750.00	1,207.49	889.85	0.00-30,750.00	1981.57	860.93	0.00-38,250.00	1864.734
Behavior group therapy	593.07	0.00-12,900.00	999.01	571.18	0.00-14100.00	1152.18	473.60	0.00-12,900.00	927.935
Laboratory test	487.50	0.00-8,360.00	693.20	458.52	0.00-3,940.00	562.16	368.44	0.00-368.44	402.01
Emergency service	479.25	0.00-1,000.00	109.67	8,249.00	0.00-500.00	185.65	-	-	-
Nursing services	178.77	0.00-10,020.00	394.96	153.88	0.00-2,850.00	159.80	132.68	0.00-5,480.00	191.56
Psychotherapy	142.16	0.00-2,400.00	320.53	87.61	0.00-2,400.00	258.79	103.44	0.00-1,800.00	266.66
Electroconvulsive therapy	75.93	0.00-2,700.00	252.07	97.69	0.00-2,500.00	269.09	57.35	0.00-1,500.00	181.82
Radiology	52.06	0.00-1,020.00	152.43	67.12	0.00-3,910.00	182.11	61.89	0.00-1,020.00	154.32
Electrocardiography	26.06	0.00-600.00	74.38	42.65	0.00-600	88.71	29.52	0.00-600.00	73.72
Psychological test	22.12	0.00-1,000.00	109.79	20.82	0.00-900.00	108.60	18.17	0.00-1,400.00	105.056
Physical therapy	10.08	0.00-1,050.00	66.91	2.81	0.00-900.00	31.59	0.75	0.00-300.00	11.97
Dental service	3.05	0.00-1,370.00	45.04	6.22	0.00-4,400.00	123.12	32.69	0.00-2330.00	138.54
Electroencephalography	1.49	0.00-900.00	36.65	4.54	0.00-1,800.00	72.36	1.28	0.00-900.00	33.90
Average total cost per admission	23,629.10	1,230.00-171,740.00	20,235.97	20,226.90	800.00-295,210.00	20,017.02	17,119.00	720.00-130,650.00	12,947.83

Table 3 gives parameter estimates and standard error from generalized linear models with log link on total costs over the 3-year period. Gender, age, types of payment scheme and behaviors under surveillance were signification in predicting total cost. Number of comorbidities did not have any significant associations with the total cost. Controlling for other independent variables in the model, patients who had attempted suicide, hospital escape and accident prone had higher cost than those of no behavior under surveillance. For instance, the predicted total cost for the schizophrenia for reference group was exp(10.010)=22,026.47 Baht, and the total for the schizophrenia who had suicide attempted was exp(10.010+0.328) =31,888.48 Baht and increase of 9,862.01 Baht. Female patients decreased the total cost from the reference group by about

2,215.32 Baht. In addition, the total cost of patients under social security and universal coverage schemes spent significantly less than those under civil servant medical benefit and self-payment.

Table 3 Factors influencing total cost of inpatient care using Generalized linear Model (GLM) with gamma distribution and log link function (n=4,002).

variable	Beta	S.E.	Wald Chi-Square	p
Constant	10.010	.117	7233.46	0.000
Gender				
male	0			
Female	-0.116	0.039	8.883	0.003
Age	0.005	0.002	8.053	0.005
Payment methods				
Self payment	0			
Civil Servant Medical Benefit	-0.158	0.129	1.489	0.222
Universal Coverage	-0.325	0.099	10.839	0.001
Social Security	-0.703	0.137	26.172	0.000
Comorbidities				
0	0			
1	0.069	0.040	2.986	0.084
2+	0.064	0.067	0.914	0.339
Behavior under surveillance				
Suicide Attempts	0.328	0.150	4.773	0.029
Accident Prone	0.018	0.114	0.025	0.874
Violent Behavior	-0.087	0.102	0.742	0.389
Hospital escape	0.321	0.102	9.873	0.002

Discussion

In this study, we collected data on all inpatient with schizophrenia who were discharge from the Khon Kaen Rajanagarindra psychiatric hospital in Thailand from 2010 to 2012. The cases, therefore, were not representative of schizophrenia inpatients in Thailand, but the inpatient treatments and costs at this hospital were probably similar to these of psychiatric hospital in Thailand. However, the schizophrenia patients in the present study probably differed from those admitted to general hospitals and to medical school hospitals.

Besides a problem of generalization, the most prominent finding was that the number of hospitalization has been on the increase. In 2010-2012, the average length of stay was 40.46, 29.98

and 22.62 days, respectively, with the average length of stay of 30.54 days over the 3-year period. This finding is inconsistent with reports from previous descriptive analysis[21]. It was found that the mean length of stay for schizophrenia was 15.36 days in 2005. However, in our study mean LOS had been decreased over 3 years. This may be due to the fact that healthcare costs have soared from 51 billion Baht in 2002 to 108 billion Baht in 2011 and Thai government tried to limit the availability of costly medicine through audits of hospital in 2009[18].

The mean total direct cost of inpatient care in our study was 23,629.10, 20,226.90 and 17,119.00 Baht per admission in 2010, 2011 and 2012, respectively with the mean total cost of 20,157.10 Baht per admission over the 3-year period. As our data, the difference of the direct cost of service and DRG cost was 5,129.43 Baht. The similar results was found in Phuaphanpraser and Pannarunothaireport in 2008 that the mean cost per admission at SuanPrung psychiatric hospital was 20,766 Baht. Another study by Homkanjun[21] examined the average cost per admission for schizophrenia at the Ramathibodi hospital and found the mean cost per admission at was 56,388.44 Baht. The higher cost reported by Homkanjun could be explained by type of hospital where the Ramathibodi hospital is the medical school hospital, focusing on educate medical professionals and conduct research.

Our study found that hospital bed, inpatient care and medication were found to be an important component of the total direct cost for schizophrenia in Thailand. The total percentage of direct costs of schizophrenia incurred by hospital bed, inpatient care and medication was 40.78%, 39.56% and 7.69%. Similar result was found from Lan and Su[12] study the cost of schizophrenia treatment in Taiwan. It has been reported that medication cost for one admission was 10.5%.

Our finding indicated that age, gender, types of payment and behaviors under surveillance were the key determinants of inpatient care costs. The highest total cost was found in patients who had a suicide attempt which is consistent with results from Zhu et al.[13] study. This may be explained by the fact that patients with a high risk of suicide attempts may have some of their cost from a longer length of hospital stay and higher medication cost.

Female had a lower cost of inpatient care than male patient. The results of previous studies contradict our findings. The results from Zeidler et al. [14] study found that female schizophrenia patients have a higher probability of hospitalization and have a higher cost of treatment. The difference in their study may relate to difference in patient being comorbid with substance abuse. We also found that the patients with universal coverage and social security patient had significantly lower hospital cost per admission than the reference group. The difference may be due, in part, to the payment system. Thailand's universal coverage scheme uses Diagnosis Related Groups and the social security scheme uses capitation for inpatient groups whereas the civil servants and self-payment use fee-for-services payments to the hospital. Also, the benefits under civil servants and self-payment scheme are better than those under schemes in that the eligible person are free to choose any hospital as they wish.

Conclusion

The cost of schizophrenia is substantial. It is timely to examine the factors that might influence the cost of schizophrenia inpatient care. Our study suggests that factors associated with increased total cost such as age, being behavior under surveillance and payment method could be examined in greater depth to improve the planning of inpatient care.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

CONTRIBUTORS

Dr. Vatinee Sukmak conceptualized the methods and the analysis and wrote the first draft of the manuscript; Dr. Jaree Thongkham cleaned data; Dr. Vatinee Sukmak wrote the first draft of the manuscript. Both authors contributed to and have approved the final manuscript.

Acknowledgements

This research was supported by Mahasarakham University. The authors wish to thank Khon Kaen Rajanagarindra Pychiatric Hospital for permission to utilize the dataset.

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