The functionality and economic costs of outpatients with schizophrenia in Taiwan

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Abstract

The aims of this study were to investigate the economic costs of outpatients with schizophrenia in Taiwan, and to survey factors that influence the costs. The direct costs were defined as the costs associated with psychiatric services and other medical treatment. The indirect costs were estimated using the Human Capital Method. Patients' characteristics, including sex, age, duration of education, duration of illness, frequency of hospitalization, type of antipsychotic medication, severity of extrapyramidal side effects caused by antipsychotic medication, and global functions, were used to estimate the costs. The average annual total cost was approximately US$16,576 per patient. The direct and indirect costs were 13% and 87% of the total costs, respectively. Among the direct costs, folk therapy ranked third, just behind prescription drugs and acute ward hospitalization. The productivity loss of both the patients and their caregivers was the major component of the indirect costs. The patient's age and global functions had a significantly negative relationship with the direct costs. The severity of extrapyramidal side effects, type of antipsychotic medication, and the patient's illness duration correlated positively with the indirect costs, while the patient's global function correlated negatively with the indirect costs. Overall, the indirect costs of treating schizophrenia were higher than the direct costs. Improving patients' functionality and decreasing caregivers' burden are essential to reducing costs.
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1. Introduction

Schizophrenia is a costly mental disorder (Andrews et al., 1985; Burns and Raftery, 1991). The economic costs of patients with schizophrenia include the direct treatment costs and indirect costs in the form of lost income (Andreasen, 1991). Internationally, the costs related to schizophrenia have demonstrated a wide variation (Hall et al., 1985; Wasylenki, 1994; Evers and Ament, 1995; Rouillon et al., 1997; Goeree et al., 1999; Guest and Cookson, 1999; Rice, 1999; Rund and Ruud, 1999; Knapp, 2000; Tarricone et al., 2000; Knapp et al., 2002, 2004; Carr et al., 2004). A study in the Netherlands showed that about 2% of the total health care budget was spent on the treatment of schizophrenic patients (Evers and Ament, 1995). For the United Kingdom, Knapp (2000) reported that 3% of the total expenditure by the National Health was accounted for by schizophrenic patients.

Many of the previous studies have focused only on direct pharmaco-economic evaluations (Gunderson and Mosher, 1975; Hall et al., 1985; Goeree et al., 1999; Rund and Ruud, 1999; Knapp, 2000). However, this is an obvious shortcoming, because the proportion of direct treatment pharmaco-economic costs, out of the total costs, is small. Besides, the costs of schizophrenia are not simply monetary. The overall costs should also include the social and psychological costs incurred by patients and their family members. Previous studies in the U.S demonstrated that direct and indirect costs represented 38% (range: 33–41%) and 62% (range: 59–66%) of the total costs, respectively (Gunderson and Mosher, 1975; Rice, 1999). A 1999 U.K. social study revealed that indirect costs due to lost productivity accounted for 49% of the National Health Service expenditure on schizophrenia (Guest and Cookson, 1999). Rouillon et al. (1997) reported that, in France, the average annual cost for medical care and social allowance per schizophrenic patient was estimated at F54,970 (French Francs) and F22,905, respectively. The actual ratio of indirect costs to total cost may be even higher. Indirect costs are often underestimated, since schizophrenic patients are unlikely to become active participants in the labour force again (Evers and Ament, 1995).

Modeled after the US system, the mental health care system in Taiwan was implemented after World War II. Initially, mental hospitals were created for schizophrenic patients as they were often abandoned by their families. Psychiatric services in the general hospitals were started later. Following the tide of deinstitutionalization, health care providers in Taiwan also attempted to shorten hospitalization days and reduce the number of in-patient beds.

The government covers 90% of the psychiatric care fees through the Bureau of National Health Insurance (BNHI) in Taiwan since 1995. According to the BNHI, 96% of all citizens participated in this insurance program in 2000 (Bureau of National Health Insurance, 2000).

Due to health care resource constraints, the rising costs of treating patients with schizophrenia and the emergence of the multiplicity care arrangement, strategies for improving cost effectiveness have attracted research interest in recent years in Taiwan as well as other countries (Lin et al., 2001; Knapp et al., 2002; Basu, 2004; Yang et al., 2005).

In contrast with the West where (institutionalized care) dominates, most of the psychiatric patients in Taiwan are cared for by their families. Psychosocial factors, including the acceptance of psychiatric services, the perception of illness, and the patients' or their relatives' knowledge of disease, could affect the process of help-seeking in pa-

tients with schizophrenia (Lin et al., 1982; Stueve et al., 1997; Yang et al., 1999; Provencher et al., 2000; Shibre et al., 2001). In turn, these factors might have influenced the prognosis and costs of schizophrenia treatment (Yang et al., 1999). Determination of the composition and predictive factors of the costs may be a prerequisite for reducing the economic impact of schizophrenia.

Although the patient's functionality is one of the most important factors affecting the treatment outcome of schizophrenia, the monetary relationship between the patient's functionality and the costs has not been well elucidated. The objectives of the present study were to: (i) estimate the annual costs of outpatients with schizophrenia in Taiwan; and (ii) survey cost-related factors, including global function. Given the magnitude of the cost estimates, we expect that there will be potential for improving cost-effectiveness.

2. Material and methods

2.1. Subjects

Seventy-four stable patients (42 males and 32 females) with schizophrenia, who had remained on either haloperidol or risperidone treatment for at least 1 year, were consecutively enrolled at the psychiatric outpatient clinics in the cities of Tainan ($N=23$), Chiayi ($N=18$), and Changhua ($N=33$) during the study period (August 1999 to May 2000). During this period, the BNHI rules stipulated that only patients with the following documented conditions could be prescribed atypical antipsychotics (such as risperidone): (1) severe extrapyramidal side effects (EPSEs) with conventional antipsychotics; (2) non-responsiveness to conventional antipsychotic treatment; or (3) old-age psychosis. All subjects in the risperidone group were approved by the BNHI.

These cities are located in central and southern Taiwan. The demographic and economic characteristics were not significantly different among these cities. The patients' mean age was 33.7 (S.D. = 8.4) years old, and the caregivers' (35 males and 38 females) mean age was 54.6 (S.D. = 12.9) years old. The mean duration of illness was 9.8 (S.D. = 7.3) years.

The major caregiver of each patient in this study was defined according to the following criteria: (1) living with the patient; (2) entitled to decide the treatment mode and medication type; and (3) responsible for the daily care of the patient.

Informed consent was been obtained from patients and their caregivers. The Ethical Committee for Human Research at National Cheng Kung University Medical Center approved the study protocols.

Table 1
Itemized monetary costs for each patient (Direct costs)

Category	Items	Calculations	US$[a] (Mean±S.D.)	As % of direct costs	As % of total costs
Direct costs			2114.81±2163.14	100	12.76
Psychiatric services					
Institutional services					
Acute ward	Hospitalization payment	Number of days × actual payment	66.98±212.95	3.17	0.40
	Insurance payment	Number of days × US$31.3 + others	313.89±787.07	14.84	1.89
Outpatient clinics	Outpatient services	Actual payment	33.23±33.26	1.57	0.20
	Insurance payment	US$ 7.4/time + others	96.57±32.58	4.57	0.58
Day hospital	Hospitalization payment	Number of days × patient's actual payment	30.36±183.73	1.44	0.18
	Insurance payment	Number of days × US$ 17.1	202.38±686.13	9.57	1.22
Emergency	Emergency treatment	Patient's actual payment	3.48±24.03	0.16	0.02
	Insurance payment	US$17.1/time × others	0.96±3.41	0.05	0.01
Community services					
Home care	Insurance payment	US$11.4 – 22.9/time	10.56±45.03	0.50	0.06
Rehabilitation	Insurance payment	US$7.1/time	0.00±0.00	0.00	0.00
Shelter payment	Insurance payment	US$7.1/time	0.10±0.84	0.00	0.00
Drugs	Prescription drug payment	Daily drug cost × 365	947.63±678.62	44.81	5.72
Non-psychiatric medical services					
	Folk therapy	Patient's actual payment	342.26±1305.23	16.18	2.06
	General medicine	Patient's actual payment	3.25±17.5	0.16	0.02
	Traditional Chinese medicine	Patient's actual payment	62.75±410.85	2.97	0.38
	Non-prescription medication	Patient's actual payment	0.38±2.73	0.02	0.00
	Temples and private shelters	Patient's actual payment	0.00±0.00	0.00	0.00
	Psychological therapy	Patient's actual payment	0.00±0.00	0.00	0.00

[a] The unit of Costs in this column is US$ (NT$35=US$1, 1999).

2.2. Assessments

The patients were assessed using the following instruments when they visited outpatient clinics during the study period:

1. Mandarin Chinese version of the Positive and Negative Syndrome Scales (PANSS) (Kay et al., 1987): This scale was used to assess schizophrenic symptoms. The mean score for positive and negative symptoms was 13.77 (S.D.=4.68) and 18.38 (S.D.=6.20), respectively. EPSEs caused by antipsychotic medication were assessed using the Simpson–Angus Scale (SAS) (Simpson and Angus, 1970). The mean score was 6.4 (S.D.=3.9); the mean score in haloperidol subgroup was 7.06 (S.D.=4.33), in risperidone subgroup it was 5.84 (S.D.=3.36) (t=1.32; P=0.19). Global functions were assessed using the Global Assessment Scale (GAS) (Endicott et al., 1976). The mean score was 48.2 (S.D.=12.2).
2. Economic cost questionnaire (Yeh et al., 1997): The economic costs included direct costs and indirect costs over the previous year. The direct costs were defined as

those associated with psychiatric service expenditures such as hospitalization costs, outpatient costs, day hospital costs, community rehabilitation costs, and other medical treatment costs. The unit costs stipulated by BNHI were similar to those obtained at all three sites. The sites were defined as the psychiatric departments of general hospitals. The direct costs related to psychiatric services were categorized into five types of unit service costs (hospitalization, OPD, emergency, home care, and day hospital). The BNHI pays a flat fee for each day of day hospitalization, regardless of the types of care received. The costs for the remaining four types of psychiatric services were obtained by multiplying the cost per unit (or per day) by the number of units (or days). The costs for all the services were obtained by adding the patient's co-payments to the BNHI's payments. All of these data were obtained from the accounting department at the research sites. Indirect costs were defined as the costs associated with time, loss of productivity, transportation and community resources. However, the indirect costs associated with the caregivers' psychological burden were omitted because the monetary estimation

Table 2
Itemized monetary costs for each patient (Indirect costs)

Category	Items	US$ [a] (Mean±S.D.)	As % of indirect costs	As % of total costs
Indirect costs		14,461.4±9123.69	100	87.24
Time cost				
(for those currently employed)				
Time cost for patients (unit: h)	(Acute hospitalization days×8 h/day+ Day hospitalization days×8 h/day+ One-way time+Time for treatment)× average hourly earnings	999.19±2717.59	6.91	6.03
Time cost for caregivers (unit: h)	(One-way time+Acute hospitalization days×8 h/day)×average hourly earnings	9.43±18.28	0.07	0.06
Productivity loss				
(for those currently unemployed)				
Patient	The average hourly wage for the same sex and age in Taiwan (adjusted by unemployment rate)	7159±5457.06	49.50	43.19
Caregiver	The average hourly wage for the same sex and age level in Taiwan (adjusted by unemployment rate)	6273.25±6259.75	43.38	37.84
Other costs				
Transportation	One-way fare×2×times	6.18±8.75	0.04	0.04
Community resources	Facilities repair costs	7.17±53.43	0.05	0.04
Community resources	Neighbours' service time×average hourly wage	7.17±53.43	0.05	0.04

[a]The unit of Costs in this column is US$ (NT$35=US$1, 1999).

of a psychological burden is difficult. The Human Capital Method was used to estimate the monetary value of healthy time using market wage rates. Hence, lost productivity was calculated using average wages with adjustments for age, educational level and gender, and for the length of time the patients had been absent from work or how early they retired ahead of the average age of retirement (Rice, 1999). The monetary values of these costs for each patient are summarized in Tables 1 and 2.

3. Knowledge of Schizophrenia (KOS): This 14-item questionnaire was used to assess the caregivers' knowledge regarding the four aspects of schizophrenia: symptoms, causes, treatments, and community rehabilitation (Rudnick and Kravetz, 2001). Each question was rated as "correct (=1)", "wrong (=0)", or "unknown (=0)". The total score (maximum of 14) was derived by summing up the scores of all the questions. The Cronbach's α in the current study was .79. The mean score was 7.6 (S.D.=3.3).

4. Perceived Causes of Illness (PCI): This self-reported questionnaire for caregivers' was compiled with reference to a study by Krauss and Erickson (1988). The questionnaire, which comprised 20 questions, was used to assess the caregiver's perception of the cause of the disease. Each question was rated on a 4-point Likert scale (1=not at all; 4=totally), with

higher scores representing higher levels of causality. There were five subscales of disease attribution: psychodynamic, biological, environmental, moral, and supernatural. The total score of each subscale (with four questions each) was obtained by summing up the scores on the questions. We only used the biological attribution subscale in this study. The attribution of illness was categorized as either biological or non-biological according to the score of biological attribution subscale with cut-off point of 5. The internal consistency as measured by Cronbach's α was 0.54. The mean score was 5.42 (S.D.=2.83).

Trained psychologists performed personal structured interviews to collect data using an economic cost questionnaire, the KOS, and the PCI. The PANSS, SAS and GAS were rated by psychiatrists. The Chinese versions of the KOS and the PCI had been developed and standardized, and they scored highly on both reliability and validity (Wu et al., 1996; Yang et al., 1999).

2.3. Statistical analysis

The costs were estimated by summing up all of the related costs. *T*-tests were used to analyze the differences in demographic and clinical characteristics between two drug groups. Pearson's correlation or *t*-test was

Table 3
Comparison of cost of illness in schizophrenia in different countries

Country	Taiwan	USA	UK	Italy
Source	This study[1]	Rice and Miller (1996)[2]	Guest and Cookson (1999)[3]	Tarricone et al. (2000)[4]
Year of costing	1999	1990	1997	1995
Direct costs (per patient per year)	$2114	$6918	£11,599	ITL14.82 million
Hospitalization cost (% of direct health care costs)	17.9%	68%	69%	16.5%
Cost of drugs (% of direct health care costs)	43.6%	2.3%	2%	7.0%
Indirect costs	$14,461	$6097	£11,401	ITL34.54 million
Family impact loss (% of indirect costs)	43.4%	17%	2.3%	41.2%

[2,3]National study, top down approach.
[1,4]Non-top down approach.
[3]For newly diagnosed patients.

Table 4
Comparison of demographic variables, clinical variables, caregivers' attitude, and costs between different drug groups

Categories	Drugs groups		Statistics		
	Haloperidol	Risperidone			
Mean dose of medication (mg/day)	4.10 (1.60)	7.58 (5.71)	t/χ^2	df	P
Demographic variables					
Sex (male/female)	18/16	24/16	$\chi^2=0.37$	1	0.54
Age (years)	34.85 (8.97)	32.65 (7.85)	$t=1.13$	72	0.26
Duration of education (years)	9.79 (3.2)	10.93 (1.86)	$t=-1.89$	72	0.06
Clinical variables					
Duration of illness (years)	10.93(8.02)	8.77(6.68)	$t=1.23$	68	0.22
Frequency of hospitalization			$\chi^2=0.48$	2	0.79
None	11	16			
One	10	10			
Two or above	13	14			
PANSS					
Positive domain	13.81 (4.6)	13.73 (4.81)	$t=0.07$	67	0.94
Negative domain	18.56 (6.54)	18.22 (5.97)	$t=0.23$	67	0.82
GAS	48.85 (14.29)	47.68 (10.21)	$t=0.40$	69	0.69
SAS	7.06 (4.33)	5.84 (3.36)	$t=1.32$	67	0.19
Caregivers' attitude					
KOS	7.18 (3.65)	7.94 (3.03)	$t=-0.90$	60	0.37
PCI (biological/non-biological cause)	17/11	20/14	$\chi^2=0.02$	1	0.88
Costs†					
Direct	1.34 (1.83)	2.88 (2.45)	$t=-2.98$	70	<0.001**
Medication	0.4 (0.26)	1.41 (0.57)	$t=-9.23$	70	<0.001**
Other direct costs	0.91 (1.83)	1.47 (2.45)	$t=-1.08$	70	0.28
Indirect	12.31 (9.66)	16.59 (8.47)	$t=-2.02$	71	0.05*

PANSS: Positive and Negative Symptom Scales; GAS: Global Assessment Scale; SAS: Simpson–Angus Scale; KOS: Knowledge of Schizophrenia; PCI: Perceived Causes of Illness.
†The unit of Costs in this column is US$1000 (NT$35=US$1, 1999).
*: $P<.05$; **: $P<.01$; ***: $P<.001$ (two-tailed).

Table 5
Correlations between patients' demographic variables, clinical variables, and caregivers' attitude and costs

Categories	Direct cost statistics (P)	Indirect cost statistics (P)
Demographic variables		
Sex (male/female)[a]	$t=-0.73$ (0.47)	$t=-0.52$ (0.60)
Age (years)	$r=-0.34$ (0.003)**	$r=0.15$ (0.21)
Duration of education (years)	$r=-0.02$ (0.89)	$r=0.09$ (0.46)
Clinical variables		
Duration of illness (years)	$r=-0.27$ (0.03)*	$r=0.25$ (0.04)*
Frequency of hospitalization	$r=0.17$ (0.15)	$r=0.15$ (0.20)
PANSS		
Positive domain	$r=0.2$ (0.09)	$r=0.25$ (0.04)*
Negative domain	$r=0.02$ (0.87)	$r=0.16$ (0.19)
GAS	$r=-0.27$ (0.02)*	$r=-0.40$ (0.001)***
SAS	$r=0.09$ (0.48)	$r=0.31$ (0.01)**
Medication (risperidone/haloperidol)[a]	$t=-2.98$ (0.004)**	$t=-2.02$ (0.05)*
Caregivers' attitude		
KOS	$r=0.23$ (0.08)	$r=0.10$ (0.40)
PCI (biological/ non-biological cause)[a]	$t=-1.44$ (0.15)	$t=0.69$ (0.50)

PANSS: Positive and Negative Symptom Scales; GAS: Global Assessment Scale; SAS: Simpson–Angus Scale; KOS: Knowledge of Schizophrenia; PCI: Perceived Causes of Illness.
[a]*T*-test; *: $P<0.05$; **: $P<0.01$; ***: $P<0.001$ (two-tailed).

performed to analyze the relationship between the costs and the explanatory variables, including (1) demographic variables (patients' sex, age, duration of education); (2) clinical variables (duration of illness, frequency of hospitalization, psychopathology (PANSS), extrapyramidal side effects (SAS), global functions (GAS), and the type of medication (risperidone or haloperidol)); and (3) caregivers' attitude (KOS and PCI).

Stepwise multiple linear regression models for predicting the direct and indirect costs were constructed using variables that significantly correlated with the costs and independent variables. Only subjects with complete information ($N=64$) were included in the models. As dependent variables, the logarithms to the base 10 of direct costs were used, since they were symmetric and nearly normally distributed. Our analyses of the residuals showed that the logarithmic transformation was appropriate. All of the analyses were performed using the SPSS software (SPSS Inc., Chicago, IL, U.S.A.).

3. Results

The annual average total cost was approximately US$16,576 (NT$580,167, S.D.=NT$344,128) (NT$=

New Taiwanese dollars); (NT$35=US$1, 1999) for each patient, 13% (US$2115) of which was direct costs, and 87% (US$14,461), indirect costs. The mean annual mental health care cost from BNHI in this study was US $1572 (S.D.=1608). There were no significant differences in any of the demographic variables (age, education years, and illness years) or the direct and indirect costs among the sites. The largest component of the direct costs was medication (5.72%), followed by the expenses for acute ward hospitalization (2.29%), and folk therapy (2.06%). As for the indirect costs, productivity loss (81.03% of the total costs, or 43.19% and 37.84% for the patient and their caregivers, respectively) accounted for the highest proportion (Tables 1 and 2). A comparison of the costs of illness with those of studies from the U.S. (Rice and Miller, 1996), the UK (Guest and Cookson, 1999), and Italy (Tarricone et al., 2000) is shown in Table 3. The direct costs in our study were much lower compared to those of the aforementioned studies. The proportion of hospitalization costs in the direct costs was comparable to that of the Tarricones's report while the proportion of cost of drugs in our study was the highest. Both Tarricone's and our studies support the finding that family impact costs account for approximately 40% of the indirect costs.

The results of our *t*-tests showed that the characteristics of the risperidone and haloperidol groups were not significantly different in the demographic or clinical variables (Table 4). The direct and indirect costs were higher in risperidone group. However, the direct costs excluding the medication expenditure was not different between these two groups.

The correlation matrix and *t*-test analyses between the patients' and their caregivers' characteristics and different costs are shown in Table 5. Age, duration of

Table 6
Stepwise multiple linear regression analysis of costs ($N=64$)

Categories	Direct cost[a]	Indirect cost
Independent variables	β (s.e.)	β (s.e.)
Age (years)	−0.25 (0.001)*	NA
Duration of illness (years)	−0.14	0.28 (4.61)**
SAS	NA	0.29 (8.70)**
GAS	−0.29 (0.001)**	−0.38 (2.68)***
Type of antipsychotics (haloperidol=0; risperidone=1)	0.49 (0.001)***	0.31 (67.84)**
Adjusted R^2	Adjusted $R^2=0.42$ $F(3, 60)=15.91$	Adjusted $R^2=0.38$ $F(4, 59)=9.09$

[a] The scale of direct costs was transferred by $\log_{10}$. The unit of cost was NT$1000.
SAS: Simpson–Angus Scale; GAS: Global Assessment Scale.
*: $P<.05$; **: $P<.01$; ***: $P<.001$ (two-tailed).

illness, and GAS correlated negatively with direct costs. Duration of illness, positive domain of the PANSS, and SAS correlated positively, and GAS correlated negatively with the indirect costs. The risperidone group incurred higher direct and indirect costs than the haloperidol group. Caregivers' attitude (PCI and KOS) did not correlate with the costs.

For both direct and indirect costs, we developed regression models using the significant variables. Stepwise multiple regression analyses of the direct costs (Table 6) indicated statistically significant differences among the types of antipsychotics, the GAS scores, and the patients' age, but not the duration of illness. In the indirect cost model, all variables (the GAS scores, type of antipsychotics, patients' illness duration, and the SAS scores) were significantly different.

4. Discussion

The results of this study revealed that schizophrenia is a costly disease in Taiwan as well as in the west. In 1999, the mean of the National Health Expenditure in Taiwan for each person was about US$734, or about 5.46% of the Gross Domestic Product (GDP) (Taiwan Year Book, 2005). Results of this study showed that the annual average of direct costs for each schizophrenic patient was US$2115, almost three times higher than the mean of the National Health Expenditure in 1999 in Taiwan. This evidence supports our hypothesis that patients with schizophrenia in Taiwan utilized a disproportionately high amount of health care services, just as that reported by western countries (Hall et al., 1985; Evers and Ament, 1995; Goeree et al., 1999; Guest and Cookson, 1999; Rice, 1999; Rund and Ruud, 1999; Knapp, 2000). The indirect costs were significantly higher than the direct costs, which is consistent with that reported by other studies (Rice, 1999; Tarricone et al., 2000). However, the proportion of indirect costs in this study (87%) was even higher than that of other studies (Hall et al., 1985; Evers and Ament, 1995; Goeree et al., 1999; Rice, 1999; Rund and Ruud, 1999; Knapp, 2000). While considerable differences in service utilization patterns and costs exist among various studies, the methodological inconsistencies should be taken into consideration when comparing the results of different studies.

One of the reasons for the higher proportion of indirect costs for treating schizophrenia in Taiwan may be the lower insurance payment for medical services (the usual physician's fee for each visit is only about US$10 in Taiwan). In addition, our results showed that the loss of productivity was the major component of indirect costs in Taiwan. Productivity loss was noted not only for the patients themselves, but also for their caregivers. Low employment rates were found both in patients with low functionality and their caregivers in this study (32.9% and 46.6%, respectively). The high level of indirect costs revealed here is mostly attributable to the productivity loss. Unlike the majority of cost of illness studies which use a top down approach (Rice and Miller, 1996; Guest and Cookson, 1999; Rice, 1999), this study assess the costs from a societal perspective and highlights the individual cost components including folk therapy and loss of productivity of caregivers, but excluding the social security outlays and criminal justice system costs. The high indirect costs underscore the burden schizophrenia places on society and the importance of comprehensive evaluation of cost-effectiveness.

Our previous study revealed that schizophrenia patients with more severe cognitive deficits may incur higher indirect costs (Ko et al., 2003). The regression model of the current study also showed that the patients' functionality, as measured by the GAS score, is a major predictor of not only the indirect costs but also the direct costs. This finding is consistent with those of Knapp (2000) and Carr et al. (2004).

Considering the high care costs of patients with schizophrenia, the functional and occupational impairments must be rectified. To reduce the costs of schizophrenia, psychiatric service policies should focus on enhancing the patients' global functional levels (Velligan et al., 2000), reducing hospitalization days, and enabling patients to return to active employment (Muller and Caton, 1983; Guest and Cookson, 1999). Only then can the caregivers' burden be reduced.

The low utilization of community care services may be one of the important reasons for the high productivity loss in caregivers. This study showed that the costs of community care in this study were only about 0.06% of the total costs. Burns and Raftery (1991) suggested that the provision of active community services for patients with schizophrenia may lead to overall savings in care costs. However, if community care programs are not well organized and developed following a reduction in in-patient beds, efforts to reduce direct costs may just shift the burden back to the patients, their families and communities, and hence increase the indirect costs.

Because the illness attribution (to supernatural causes) and the stigmatization of schizophrenia in countries with less developed mental health care system differ from those of the west, delay in help-seeking is prevalent (Breakey, 1996; Yang et al., 1999; Knapp et al., 2002; Thornicroft and Tansella, 2003; Yeh et al., 2003). The patients and

families more frequently rely on sources of support outside the mental health care sector such as priests, confidants or traditional "alternative" treatments, such as natural remedies or meditation (Angermeyer et al., 2005).

Although the PCI and KOS scores did not correlate with the costs, the actual outlays for psychiatric acute ward treatment were comparable to those for folk therapy in the current study. 31.5% (23/73) of schizophrenic families in our study either donated money to the temples or paid the healers for rituals to appease the demons.

To our knowledge, this is the first head-to-head comparison study about the costs of mental health care and alternative treatments. One previous study reported that, in Taiwan, over 30% of patients and their relatives believe that the cause of schizophrenia is supernatural (Chen et al., 2002). This perceived cause of schizophrenia tends to delay help-seeking (Lish et al., 1994). Needless to say, the delay in help-seeking increases to the financial burden of the families in the form of the higher productivity loss of the caregivers. Andrews estimates that, even with optimal treatment, only 22% the burden of schizophrenia could be averted (Andrews et al., 2003). The majority of the burden remains inevitable. The high expenditure in folk therapy reflects an underlying dissatisfaction about current treatment modalities and the unmet needs of the schizophrenic patients and families even in the stable stage.

Our results also demonstrated that the undesirable extrapyramidal effects of antipsychotics in terms of SAS scores have a positive correlation with the indirect costs and total costs. Similar findings have been reported by Tarricone et al. (2000). Extrapyramidal symptoms may imply both disability and loss of productivity. For that reason, one may expect the use of atypical antipsychotics, such as risperidone, which have fewer propensities for EPSE than haloperidol, to be associated with lower costs (Wasylenki, 1994). Unfortunately, atypical antipsychotics are much more expensive than conventional antipsychotics.

Although various studies have attempted to compare the cost-effectiveness between conventional and atypical antipsychotics, the results are inconsistent because of differences in systems and methods and uncertainties in the estimates of cost savings and clinical benefits (Basu, 2004; Sevy et al., 2004). Gibson et al. (2004) found that the total costs of schizophrenia care associated with olanzapine, risperidone, and haloperidol were similar but the cost components differed. Atypical antipsychotics may have less EPSE and better use patterns which lead to decreased inpatient costs. We found that as the extrapyramidal effects decreased, the indirect costs also decreased.

The third-party payment agent in Taiwan, the BNHI, implemented strict rules for prescribing atypical antipsychotics in order to contain the increasing psychiatric care expenditures during the period of study. The BNHI's strict rules for prescribing risperidone have resulted in a selection bias in the risperidone group. The higher costs for the risperidone group patients may also be attributable to their more serious conditions compared with the haloperidol group.

These results should be interpreted with caution for several reasons. First of all, only stable outpatients were enrolled in this study. Those subjects who were selection-biased may not be representative of all patients with schizophrenia from general hospitals in Taiwan. The composition of costs for patients in different stages may vary (Guest and Cookson, 1999; Chien, 2004; Manca et al., 2005). Both community-based patients and chronic inpatients should be enrolled in the future. Secondly, the validity of the data related to the patients' conditions, such as psychotic symptoms and EPSE, may be short-lived, since the patients' conditions may have fluctuated throughout the year in which the costs were calculated. Thus, results regarding the relationships between the patients' conditions and the annual costs must be interpreted with discretion. Thirdly, the productivity loss figures used in this study are only subjective estimates, at best, due to the lack of an objective method of measurement.

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