Health Insurance System and Healthcare Provision: Nationwide Hospital Admission Data 2010

Sirirat Reungjui MD*, Siriluck Anunnatsiri MD*,
Chulaporn Limwattananon, PhD** Yupa Thavornpitak MSc***,
Piyalak Pukdeesamai MPH****, Pisaln Mairiang MD*

** Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand*
*** Faculty of Pharmaceutical Sciences, Khon Kaen University, Khon Kaen, Thailand*
**** Department of Biostatistics and Demography, Faculty of Public Health, Khon Kaen University, Khon Kaen, Thailand*
*****Phanomphrai Community Hospital, Roi Et, Thailand*

Background: *The three major health insurance systems are different in their medical service coverage, reimbursement process and choice of providers; leading to the question of how great are the variations in the healthcare offered and disease outcomes.*

Objective: *To assess whether differences exist and to analyze the effects of on healthcare provision and disease outcomes in the adult population across the three health insurance systems.*

Material and Method: *The authors analyzed the disease outcomes of the 23 major ICD-10 disease groups among the three major health insurance systems to obtain the death rates, levels of healthcare provision and the hospital charges. Factors influencing mortality rates were evaluated by multiple logistic regression analysis.*

Results: *The community, general, tertiary care and private hospitals provided hospitalization for 41.4%, 22%, 27.3% and 9.3% of hospitalized adult patients, respectively.*

Infectious & parasitic diseases were the most common causes of admissions. Disease of the digestive system was the most common cause of admission in general hospitals while malignancy was the most common in the tertiary care hospitals. Patients with congenital malformation, neoplasm, mental and behavioral disorder and diseases of the eye were commonly treated at tertiary care hospitals.

The mean and median of hospital charges were highest in the Civil Servant Medical Benefit System (CSMBS) (26,668; 10,209 Baht), followed by the Social Security System (SSS) (21,455; 9,713 Baht) and the Universal Coverage System (UC) (13,086; 5,246 Baht). The respective overall mortality rates for the CSMBS, SSS and UC were 4.40%, 1.38% and 3.32%. After adjustment, however, a significant association between UC and mortality was found with an odds ratio of 1.43 (1.40-1.45) as compared to CSMBS. In addition, other factors most influencing mortality rates were male sex, elderly age, and the levels of healthcare.

Conclusion: *The differences in charges for some groups of diseases and significantly different clinical outcomes across schemes existed. The differences in disease outcomes were not adjusted for socioeconomic status and disease severity, requiring a cautious interpretation; nevertheless, an association with a higher mortality rate under the UC scheme for in-patient services need prompt further study.*

Keywords: *Health insurance system, Healthcare provision, disease outcomes, hospital charges, factors influencing mortality*

J Med Assoc Thai 2012; 95 (Suppl. 7): S240-S253
Full text. e-Journal: *http://jmat.mat.or.th*

Thailand achieved universal coverage of healthcare in early 2002. There are three public insurance schemes, the non-contributory Civil Servant Medical Benefit Scheme (CSMBS) for some government employees, pensioners and their dependants (8% of total population); the Social Security Scheme (SSS) for formal private sector employees (15.7% of total population) financed by tripartite contributions; and the con-contributory Universal Health Coverage (UC) scheme for the rest (76.3%) of the population financed by general tax revenue. The three schemes adopt different provider payment methods and contracting with healthcare providers. The CSMBS uses a fee-for-service (FFS) model with free choice allowed to beneficiaries to any public providers for out-patient services and diagnostic- related group (DRG) payment for hospital admissions. The SSS uses a contract model using a single capitation rate and contracts with competitive public-private hospitals having > 100 beds

Correspondence to:
Mairiang P, Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.
Phone: 043-363-664
E-mail: pisaln_m@hotmail.com

and other quality pre-requisites. The UC scheme uses a contract model with several modes of payment; for example, capitation for outpatient services and prevention and health promotion services. Since 2007, all three schemes have adopted DRG for in-patient services based upon global budgets for the UC and SSS, and an open budget for the CSMBS. Beneficiaries of the SSS and UC are required to register with their preferred providers. The UC scheme, however, has a geographical monopoly whereby the Ministry of Public Health (MOPH) health centres and district hospitals are the sole providers at the district level; therefore no competitive contracting is possible.

There is no co-payment at point of services by beneficiaries in any of the schemes;[1] consequently, unnecessary utilization by patients is a major policy concern since co-payment could be a deterrent to unnecessary usage. The UC and SSS have adopted a closed-end provider payment method, whereas the CSMS adopted an FFS for outpatient services and DRG. It was hypothesized that these tools would together counteract over-utilization by healthcare users, notably illness caused by patient's moral hazards.

Although all three schemes rely on DRG payment for in-patient services, the CSMBS still has not adopted a global budget and has a higher base rate for each adjusted relative weight, as compared to those of the other two schemes. At present, a number of hospitals maintain electronic records of services for administrative purposes. Recently, a national in-patient database has been available in electronic format; allowing for assessment of hospitalization outcomes at the patient level. The authors therefore explored whether there were differences among the schemes in obtaining in-patient services and their respective disease outcomes. The results of the present study will provide essential information for improving the healthcare insurance systems and for setting standards for service provision and disease outcomes.

Objective

The objective was to examine whether differences existed among the three main insurance schemes in receiving in-patient services and disease outcomes in the adult population (age $\geq$ 19 years) by analyzing the in-patient information from the SSS, UC and CSMBS.

Material and Method

The information to be analyzed was from the in-patient medical expense forms for the fiscal year 2010 (October 1, 2009 to September 30, 2010) from the National Health Security Office (NHSO), Thailand and the in-patient data from the CSMBS from the Comptroller General's Department and the Social Security Office. First, the data were checked for accuracy by examining for (a) overlapping information (b) visit dates (c) missing items (d) incorrect coding and (e) dating with the correct fiscal year. Then a basic statistical analysis was performed on age, sex, admission rates, death rates, levels of healthcare (*i.e.*, community, general, tertiary care or private hospitals) and the average hospital charges for each of the 23 major disease groups (as per ICD-10)[2].

The government hospitals were categorized using numbers of beds and specialties into three levels: district, general and tertiary hospitals. University hospitals were included in the tertiary hospitals. Private hospitals were separately analyzed.

Outcome measures

The present study outcomes were (a) number of patients (b) number of admissions (c) levels of hospitals (d) hospital charges[3] (e) death rates and (f) factors influencing the death rates among the 23 major groups of diseases in the ICD-10 and (g) the top five major groups of diseases admitted to each level of hospitals subcategorized by insurance scheme: each outcome was compared among the three major insurance schemes (CSMBS, SSS and UC). Due to the limited availability of data on unit costs for most hospitals, hospital charges were used despite their limited ability to reflect standardized resource utilization.

Statistical analysis

The statistical analysis was done using SPSS for Windows version 13. The respective continuous and categorical data were expressed as a mean $\pm$ standard deviation (SD) or median (25^{th}-75^{th} percentile) and percentage. Multiple logistic regression analysis was performed to adjust the odds ratio for factors influencing the death rate.

Ethics approval followed an assessment by the Ethics Committee of the Faculty of Medicine, Khon Kaen University, as per the guidelines of the Helsinki Declaration.

Results

In the fiscal year 2010, the number of persons $\geq$ 19 years of age was 47,966,734-74% of the total Thai population of 64.7 millions. Approximately 96% of the adult population (46,208,964) was covered by one of

the three health insurance systems (*viz.*, the SSS, CSMBS or UC). The total number of adult in-patients was 3,876,792 who were admitted 4,863,935 times, accounting for 71% of all in-patients.

The common groups of diseases leading to hospitalization as shown in Table 1 were: A00-B99 Certain infectious and parasitic diseases, O10-O99 Childbirth and the puerperium, S00-T98 Injury, poisoning and certain other consequences of external causes, K00-K93 Diseases of the digestive system, J00-J99 Diseases of the respiratory system, I00-I99 Diseases of the circulatory system, N00-N99 Diseases of the genitourinary system, R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified, C00-D48 Neoplasms, H00-H59 Diseases of the eye and adnexa, E00-E90 Endocrine, nutritional and metabolic diseases and M00-M99 Diseases of the musculoskeletal system and connective tissue.

The patients admitted under the UC were well-distributed across every age group. There was a tendency for patients in the advanced age group (*i.e.*, 51-60, 61-70 year-olds) to be admitted more than the younger age groups. This observation was also made of patients in the CSMBS, while patients covered under the SSS tended to be younger (25-50 year-olds) (Fig 1, Table 1) .

The UC covered 3,734,583 hospital admissions (77% of all admissions). The top five disease groups leading to hospitalization were (1) childbirth and the puerperium (455,949 admissions, 12.2%) (2) infectious and parasitic diseases (425,151admissions, 11.4%) (3) diseases of the digestive system (379,532 admissions, 10.2 %) (4) diseases of the respiratory system (347,771 admissions, 9.3 %) and (5) injury and poisoning (337,400 admissions, 9.0 %).

The CSMBS covered healthcare service for 615,954 admissions (13% of all admissions). The top five groups of diseases were (1) diseases of the circulatory system (77,799 admissions,12.6%) (2) neoplasm (69,870 admissions, 11.3%) (3) diseases of the digestive system (60,843 admissions, 9.9%) (4) diseases of the respiratory system (59,508 admissions, 9.7%) and (5) infectious and parasitic diseases (57,302 admissions, 9.3%).

The SSS mainly provided coverage for the working-age population-513,398 admissions or 11% of all admissions. The top five groups of diseases admitted under this scheme were (1) infectious and parasitic diseases (77,279 admissions, 15.1 %) (2) injury and poisoning (70,297 admissions, 13.7 %) (3) diseases of the digestive system (65,638 admissions, 12.8 %) (4) diseases of the respiratory system (53,292 admissions, 10.4%) and (5) diseases of the genitourinary system (41,680 admissions, 8.1%).

The distribution of common disease groups leading to hospitalization in each region of the country was similar (Table 2). The admission rate was highest in the southern (S) region (112.8 times/1,000), followed by the northern (N) region (109.8 times/1,000 population), the central (C) region (107.0 times/1,000), and the northeast (NE) region (98.7 times/1,000). Many complicated diseases or diseases requiring specialized physicians, tended to be treated at hospitals in the central region (particularly in Bangkok), *i.e.*, diseases of the eye and adnexa (51% of cases), congenital malformations (50% of cases), neoplasm (42.6% of cases), diseases of the ear (41.8% of cases), pregnancy with abortive outcome (40.3%) and diseases of the circulatory system (39.9% of cases).

The community hospitals were the main health providers for hospitalization of the adult population (*viz.*, 2,015,799 admissions or 41.4%), followed by secondary, tertiary and private hospitals accounting for 1,068,290 (22%), 1,329,756 (27.3%) and 450,094 (9.3%) admissions, respectively. The distribution of disease groups that were the causes of admission at each hospital level are presented in Table 2.

The top five groups of diseases resulting in hospitalization at each hospital level are presented in Table 3. Infectious & parasitic diseases were the most common causes of admissions in all levels of hospital care (316,227 admissions, 15.7%). Diseases of the digestive system were the most common cause of admission to general hospitals (127,828 cases, 12.0%)

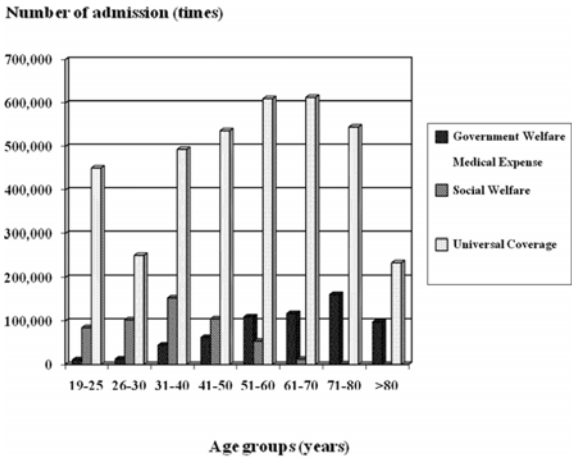

Fig. 1 Number of hospital admissions among the three main medical insurance systems

Table 1. Number of patients, number of admissions and health schemes of in-hospital adult patients in 2010 classified into 23 major groups of diseases as per ICD-10

23 Major groups of diseases classified by ICD-10	No. of patients		No. of admissions		Health Scheme (%)		
	Persons/yr	%	Times/yr	%	CSMBS	SSS	UC
A00-B99 Certain infectious and parasitic diseases	491,744	12.68	559,732	11.5	10.2	13.8	76.0
O10-O99 Childbirth and the puerperium	425,051	10.96	507,023	10.4	5.1	4.9	89.9
S00-T98 Injury, poisoning and certain other consequences of external causes	415,826	10.73	447,277	9.2	8.8	15.7	75.4
K00-K93 Diseases of the digestive system	413,453	10.66	506,013	10.4	12.0	13.0	75.0
J00-J99 Diseases of the respiratory system	327,010	8.44	460,571	9.5	12.9	11.6	75.5
I00-I99 Diseases of the circulatory system	310,522	8.01	428,820	8.8	18.1	6.3	75.6
N00-N99 Diseases of the genitourinary system	298,258	7.69	392,498	8.1	12.9	10.6	76.5
R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	196,018	5.06	213,661	4.4	12.9	9.7	77.3
C00-D48 Neoplasms	171,319	4.42	357,400	7.4	19.5	10.9	69.5
H00-H59 Diseases of the eye and adnexa	154,798	3.99	181,702	3.7	22.6	4.1	73.2
E00-E90 Endocrine, nutritional and metabolic diseases	150,917	3.89	188,833	3.9	13.8	5.8	80.4
M00-M99 Diseases of the musculoskeletal system and connective tissue	124,244	3.20	148,595	3.1	18.5	11.1	70.4
L00-L99 Diseases of the skin and subcutaneous tissue	94,094	2.43	106,192	2.2	12.6	8.7	78.7
F00-F99 Mental and behavioral disorders	70,044	1.81	87,136	1.8	9.4	5.5	85.0
G00-G99 Diseases of the nervous system	67,737	1.75	80,691	1.7	13.1	13.3	73.6
O00-O08 Pregnancy with abortive outcome	54,836	1.41	58,255	1.2	4.9	29.4	65.8
D50-D89 Diseases of the blood, blood-forming organs, certain disorders involving the immune mechanism	46,093	1.19	70,811	1.5	9.8	8.2	82.0
H60-H95 Diseases of the ear and mastoid process	31,041	0.80	33,234	0.7	18.9	18.3	62.9
Z00-Z99 Factors influencing health status and contact with health services	27,273	0.70	28,249	0.6	10.4	13.4	76.2
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	4,535	0.12	5,227	0.1	12.2	21.1	66.7
Others	1,971	0.05	2,007	0.04	0.0	0.0	100
V01-Y98 External causes of morbidity and mortality	4	< 0.01	4	<0.01	0.0	0.0	100
P00-P96 Certain conditions originating in the perinatal period	4	< 0.01	4	<0.01	50.0	25.0	25.0

Table 2. Regions and hospital levels of admission among adult in-patients in 2010 classified into 23 major groups of diseases as per ICD10

23 Major groups of diseases classified by ICD-10	Region : No per 1000 population(% for each ICD group)				Hospital level (%)			
	N	S	Co	NE	Co	G	T	P
A00-B99 Certain infectious and parasitic diseases	11.2 (17.6)	14.4 (15.6)	11.2 (31.6)	12.8 (35.2)	56.5	18.0	15.2	10.4
O10-O99 Childbirth and the puerperium	8.9 (15.4)	19.8 (23.6)	9.1 (28.4)	10.7 (32.6)	49.0	24.2	22.2	4.61
K00-K93 Diseases of the digestive system	11.9 (20.6)	9.9 (11.8)	11.1 (34.8)	10.7 (32.8)	37.8	25.3	26.9	10.0
J00-J99 Diseases of the respiratory system	11.3 (21.5)	11.4 (15.0)	10.1 (34.6)	8.6 (28.9)	55.4	17.3	17.2	10.1
S00-T98 Injury, poisoning and certain other consequences of external causes	10.7 (21.0)	10.0 (13.6)	10.6 (37.4)	8.1 (28.1)	30.6	27.6	30.7	11.0
I00-I99 Diseases of the circulatory system	9.8 (20.1)	9.1 (12.9)	10.8 (39.9)	7.5 (27.1)	33.3	24.4	34.8	7.5
N00-N99 Diseases of the genitourinary system	9.9 (22.1)	7.2 (11.1)	7.4 (29.7)	9.4 (37.0)	39.2	23.9	25.7	11.2
C00-D48 Neoplasms	8.1 (19.9)	5.6 (9.5)	9.6 (42.6)	6.5 (28.0)	14.2	18.9	58.0	8.9
R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	4.7 (19.3)	6.2 (17.4)	4.1 (30.0)	4.6 (33.2)	60.0	16.8	15.8	7.4
E00-E90 Endocrine, nutritional and metabolic diseases	4.5 (20.8)	3.0 (9.6)	3.9 (32.6)	4.5 (37.0)	61.1	16.3	16.7	5.9
H00-H59 Diseases of the eye and adnexa	3.5 (16.8)	3.2 (10.5)	5.9 (51.8)	2.5 (20.9)	13.4	28.2	40.3	18.2
M00-M99 Diseases of the musculoskeletal system and connective tissue	4.1 (24.1)	2.5 (10.2)	3.3 (35.4)	2.9 (30.2)	31.3	27.0	33.0	8.7
L00-L99 Diseases of the skin and subcutaneous tissue	2.5 (21.1)	2.3 (13.1)	2.2 (32.3)	2.3 (33.5)	55.5	19.3	18.5	6.6
F00-F99 Mental and behavioral disorders	2.3 (23.1)	1.6 (11.3)	1.7 (30.9)	2.0 (34.7)	35.7	11.5	48.8	4.0
G00-G99 Diseases of the nervous system	2.0 (21.5)	1.5 (11.1)	1.8 (34.7)	1.7 (32.7)	40.6	19.8	29.2	10.4
D50-D89 Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	2.0 (24.8)	1.2 (10.2)	1.2 (27.7)	1.7 (37.3)	48.4	22.0	23.1	6.4
O00-O08 Pregnancy with abortive outcome	0.9 (14.0)	2.1 (21.8)	1.5 (40.3)	0.9 (23.9)	30.2	24.9	28.3	16.6
H60-H95 Diseases of the ear and mastoid process	0.5 (14.5)	1.1 (20.1)	0.9 (41.8)	0.5 (23.7)	53.3	16.2	14.7	15.8
Z00-Z99 Factors influencing health status and contact with health services	0.8 (23.9)	0.5 (10.7)	0.6 (32.6)	0.6 (32.9)	40.6	24.1	26.7	8.6
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	0.1 (14.0)	0.1 (13.4)	0.2 (50.0)	0.1 (22.7)	6.6	14.5	65.1	13.8
Others	< 0.1(18.3)	0.1 (21.3)	< 0.1(12.9)	0.1 (47.6)	76.8	13.3	6.7	3.2
V01-Y98 External causes of morbidity and mortality	< 0.1(25.0)	0.0 (0.0)	< 0.1(25.0)	<0.1 (50.0)	100	0.0	0.0	0.0
P00-P96 Certain conditions originating in the	0.0 (0.0)	< 0.1(50.0)	< 0.1(50.0)	0.0 (0.0)	50.0	0.0	25.0	25.0

Note; Regions, N = North, S = South, C = Central and NE = Northeast. Hospital levels, Co = community, G = general, T = tertiary, P = private

Table 3. Top five major groups of diseases classified by ICD-10 according to hospital level among adult patients presented as number of admissions and percentage of total admissions at each hospital level

Hospital levels	Major groups of diseases				
	1	2	3	4	5
Community hospital (2,015,799) N%	A00-B99 Certain infectious and parasitic diseases 316,227(15.7)	J00-J99 Diseases of the respiratory system 255,267 (12.7)	O10-O99 Childbirth and the puerperium 248,355(12.3)	K00-K93 Diseases of the digestive system 191,430(9.5)	N00-N99 Diseases of the genitourinary system 153,990 (7.6)
General hospital (1,068,290) N%	K00-K93 Diseases of the digestive system 127,828(12)	S00-T98 Injury, poisoning and certain other consequences of external causes123,622 (11.6)	O10-O99 Childbirth and the puerperium 122,644 (11.5)	I00-I99 Diseases of the circulatory system 104,707 (9.8)	A00-B99 Certain infectious and parasitic diseases 100,544 (9.4)
Tertiary care hospital (1,329,756) N%	C00-D48 Neoplasms 207,398 (15.6)	I00-I99 Diseases of the circulatory system 149,299 (11.2)	S00-T98 Injury, poisoning and certain other consequences of external causes 137,527 (10.3)	K00-K93 Diseases of the digestive system 136,309 (10.3)	O10-O99 Childbirth and the puerperium 112,464 (8.5)
Private hospital (450,094) N%	A00-B99 Certain infectious and parasitic diseases 58,136(12.9)	K00-K93 Diseases of the digestive system 50,446 (11.2)	S00-T98 Injury, poisoning and certain other consequences of external causes 49,202 (10.9)	J00-J99 Diseases of the respiratory system 46,631 (10.4)	N00-N99 Diseases of the genitourinary system43,930 (9.8)

Note ; N = number of admissions , % = percentage of admission at each hospital level

vs. malignancy to tertiary care hospitals (207,398 cases, 15.6%).

Disease groups commonly treated at the community hospital level included (a) endocrine & nutritional and metabolic diseases, (b) symptoms & signs & abnormal clinical & laboratory findings, not elsewhere classified, (c) infectious & parasitic diseases, (d) diseases of the skin and subcutaneous tissue, (e) diseases of the respiratory system and (f) diseases of the ear and mastoid process. By comparison, patients with congenital malformations, neoplasm, mental and behavioral disorders, and diseases of the eye were more frequently treated at tertiary care hospitals.

The respective mean and median (25^{th}-75^{th} percentile) hospital charges were highest in the CSMBS [26,668 and 10,209 (4,302-22,322) Baht], followed by the SSS, [21,455 and 9,713 (4,475-21,780) Baht] and the UC [(13,086 and 5,246 (2,743-12,150) Baht] as shown in Table 4.

The top five ranking disease groups by hospital charges were (1) congenital malformations, (2) neoplasm, (3) diseases of the musculoskeletal system and connective tissue, (4) diseases of the circulatory system and (5) injury & poisoning. The mortality rate in the CSMBS was 4.4% while it was 1.38% in the SSS and 3.32% in the UC.

Comparisons among the three insurance systems are summarized in Table 5. It is noteworthy that patients admitted under the CSMBS had more severe or complicated diseases than the other schemes, as indicated by the highest (a) length of stay (b) hospital charges and (c) death rate. The disease groups commonly admitted under the CSMBS that might be responsible for the higher cost and higher death rate were diseases of circulation and neoplasm. Multiple logistic regression analysis revealed that the factors influencing the mortality rate were male sex, elderly age, level of care (tertiary > general > private > community hospital) and the insurance systems (UC > CSMBS > SSS) (Table 6).

Discussion

The three insurance schemes provided distinct and specified benefits. The UC is designed to provide healthcare for any of the general population who are ineligible to CSMBS or SSS[4]. The target population must be registered at the community hospital nearest their home. The community hospital provides primary care and very limited care for complex illnesses. When necessary, there is a line of referral. Any patient who does not follow the referral process and goes directly to a tertiary care center will have to pay all costs by themselves. By comparison, under the CSMBS, a government employee can register at any public hospital of their choosing[5] while the employee covered by the SSS must register at the contracted public or private hospital[6]. If a referral is required, the employee must go to one of the hospitals in the designated network. Only in an emergency may persons covered by the SSS or the UC be exempted from paying; however, they must be transferred to their registered hospital as soon as possible. These regulations explain why most people on UC go to community hospitals and why government employees go to tertiary care hospitals.

There were significant numbers of patients covered by the SSS whose contracted hospital was a private hospital. The present study revealed that some medical services were not widely available at community hospitals; such as diseases of the eyes, mental and behavioral disorders, neoplasms and congenital malformations. Medical services not commonly treated at general hospitals included mental and behavioral disorders and neoplasms. The number of cases with mental and behavioral disorders is rising among Thais[7]; therefore, psychiatrists should be made available at the level of general hospitals.

The medical service not commonly performed at tertiary care was childbirth and the puerperium. This might affect the training of medical students and student nurses at tertiary care hospitals since delivery cases might be insufficient to enable students to master their skills. Medical and nursing schools might have to network with general hospitals to be able to provide training opportunities in obstetrics and baby delivery. Centers of Excellence in Cardiology, Neurology, Trauma and Accidents exist but such centers are also needed for congenital malformations, deformations and chromosomal abnormalities because of the very high cost of treatment (51,545-59,685 baht/admission) and the need for a multidisciplinary team approach.

Injury and poisoning (70,297 admissions, 13.7%) were common among patients under the SSS, perhaps because of an association of injury in the workplace and traffic accidents. Consequently, workplace safety and healthy environments (SHE)[8] should be strongly emphasized and encouraged. The charges for diseases under the CSMBS were generally higher than those under the SSS and UC; perhaps because of (a) the greater number of elderly patients (b) more complicated diseases and/or (c) the greater accessibility to higher cost medicine and medical

Table 4. Comparison of charges for each of the 23 major disease groups and death rates among the three insurance systems

Major groups of diseases classified by ICD-10	Hospital charge (Baht)									Mortality rate (%)		
	CSMBS			SSS			UC			CSMBS	SSS	UC
	Sum (x 10^3)	Mean	Median	Sum (x 10^3)	Mean	Median	Sum (x 10^3)	Mean	Median			
A00-B99 Certain infectious and parasitic diseases	797643	13,920	4,396	1085843	14,051	6,387	3725758	8,763	3,604	4.87	1.78	4.84
O10-O99 Childbirth and the puerperium	280565	10,753	11,355	176388	7,061	3,659	2919348	6,403	3,988	0.01	0.04	0.02
K00-K93 Diseases of the digestive system	1221026	20,068	10,333	1481810	22,575	13,480	4708721	12,407	6,950	2.83	0.74	2.58
J00-J99 Diseases of the respiratory system	1614504	27,131	8,540	807676	15,156	8,428	4311185	12,397	5,201	9.64	1.05	6.89
S00-T98 Injury, poisoning and certain other consequences of external causes	1163430	29,394	10,005	1978586	8,146	11,414	5604977	16,612	5,411	2.38	1.13	2.15
I00-I99 Diseases of the circulatory system	3413411	43,875	11,456	1099462	240,951	15,852	7486601	23,094	6,954	8.10	4.48	9.27
N00-N99 Diseases of the genitourinary system	1075115	21,192	9,496	812267	19,488	11,496	3520250	11,731	5,878	2.94	0.46	2.24
C00-D48 Neoplasms	3191204	45,673	25,449	1527982	39,160	23,013	5752730	23,149	11,555	15.15	7.77	12.0
R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	208603	7,5461	3,653	184402	8,868	5,022	818283	4,953	2,775	1.08	0.36	1.04
E00-E90 Endocrine, nutritional and metabolic diseases	338461	2,943	5,624	212661	19,446	10,208	1197074	7,889	3,971	1.34	0.91	1.35
H00-H59 Diseases of the eye and adnexa	788517	19,190	18,777	162859	21,665	17,951	2274279	17,088	16,125	0.01	0.00	0.02
M00-M99 Diseases of the musculoskeletal system and connective tissue	1312189	47,671	20,433	585568	35,444	14,544	2647750	25,325	7,632	0.96	0.67	1.83
L00-L99 Diseases of the skin and subcutaneous tissue	299283	22,341	9,461	153953	16,700	8,555	1101034	13,174	6,108	3.19	0.43	1.98
F00-F99 Mental and behavioural disorders	131380	15,956	8,361	38448	8,020	5,315	842480	11,368	5,535	0.29	0.16	0.25
G00-G99 Diseases of the nervous system	313847	29,594	8,512	214501	20,037	6,965	802624	13,517	3,852	2.61	1.14	2.74
D50-D89 Diseases of the blood, blood-forming organs, disorders involving the immune mechanism	110541	15,976	4,854	94002	16,191	6,870	416645	7,173	3,677	1.72	0.70	1.14
O00-O08 Pregnancy with abortive outcome	18338	6,489	5,069	207248	12,107	9,237	237083	6,188	4,317	0.00	0.00	0.03
H60-H95 Diseases of the ear and mastoid process	47817	7,624	3,262	51211	8,442	5,821	72611	3,475	2,017	0.07	0.00	0.04
Z00-Z99 Factors influencing health status and contact with health services	62575	21,371	10,615	78002	20,625	12,640	232181	10,780	5,982	1.00	0.03	0.99
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	38019	59,685	23,993	62195	56,336	25,597	179687	51,545	19,363	0.53	0.50	1.21
Others	0	0	0	0	0	0	20835	10,381	3,692	0.00	0.00	2.33
V01-Y98 External causes of morbidity and mortality	0	0	0	0	0	0	13.75	3,437	3,087	0.00	0.00	0.00
P00-P96 Certain conditions originating in the perinatal period	3.66	1,832	1,832	33.59	33,590	33,590	2.18	2,181	2,181	0.00	0.00	0.00

Table 5. Characteristics of all three health schemes

Characteristics	Health Scheme Groups		
	CSMBS	SSS	UC
Number of covered adult population	4,055,759	9,671,653	32,481,551
Number of adult patients	485,164	447,230	2,944,398
Number of admissions	615,954	513,398	3,734,583
Age (mean ± SD)	63.12 ± 17.08	36.12 ± 11.07	50.55 ± 20.00
Sex (male/female)	0.78	0.81	0.72
Hospital levels (%)			
Community / General / Tertiary / private	31.02 / 23.60 / 45.18 / 0.20	2.71 / 17.85 / 23.43 / 56.00	48.49 / 22.26 / 24.93 / 4.32
Region (%)			
N / NE / C / S	18.52 / 27.28 / 40.10 / 14.11	10.98 / 9.73 / 71.72 / 7.57	21.23 / 34.99 / 28.88 / 14.90
Top five common diseases			
	- Diseases of the circulatory system - Neoplasms - Diseases of the digestive system - Diseases of the respiratory system - Certain infectious and parasitic diseases	- Certain infectious and parasitic diseases - Injury, poisoning and certain other consequences of external causes - Diseases of the digestive system - Diseases of the respiratory system - Diseases of the genitourinary system	- Childbirth and the puerperium - Certain infectious and parasitic diseases - Diseases of the digestive system - Diseases of the respiratory system - Injury, poisoning and certain other consequences of external causes
Length of stay (days)			
mean, median (25^{th}-75^{th} percentile)	7.18, 4.00 (3.00 -7.00)	4.75, 3.00 (2.00 -5.00)	4.49, 3.00 (2.00 - 4.00)
Hospital charge (baht)			
mean, median (25^{th}-75^{th} percentile)	26,668, 10,209 (4,302 - 22,322)	21,455, 9,713 (4,475 – 21,780)	13,086, 5,246 (2,743 – 12,150)
Mortality rate (%)	4.40	1.38	3.32

Table 6. Factors influencing mortality rates among hospitalized, adult, Thai patients

Variables	No. of patients(persons)	Mortality rate(%)	Crude odds ratio	Adjusted odds ratio* (95% CI)
Insurance				
CSMBS	485,164	4.40	1.0	1.0
SSS	447,230	1.38	0.31	0.69 (0.67 – 0.72)
UC	2,944,398	3.32	0.75	1.43 (1.40 – 1.45)
Sex				
Male	1,646,056	4.28	1.0	1.0
Female	2,230,736	2.46	0.57	0.72 (0.71 – 0.73)
Age				
19-30 yr	794,741	0.61	1.0	1.0
31-40 yr	582,628	1.60	2.62	2.14 (2.06 – 2.22)
41-50 yr	561,812	2.86	4.69	2.76 (2.66 – 2.86)
51-60 yr	587,664	3.67	6.02	3.27 (3.15 – 3.39)
61-70 yr	553,586	4.18	6.85	3.92 (3.78 – 4.06)
71-80 yr	534,838	5.42	8.89	5.34 (5.15 – 5.53)
> 80 yr	261,523	8.18	13.41	8.84 (8.52 – 9.18)
Region				
Northern	748,882	3.62	1.0	1.0
Northeast	1,205,506	2.18	0.60	0.69 (0.67 – 0.70)
Central	1,367,962	4.30	1.19	1.24 (1.22 – 1.26)
Southern	554,442	2.37	0.65	0.78 (0.76 – 0.80)
Hospital level				
Community	1,604,816	1.08	1.0	1.0
General	877,858	4.82	4.46	6.48 (6.34 – 6.63)
Tertiary	1,019,840	5.75	5.32	7.70 (7.54 – 7.88)
Private	374,278	1.87	1.73	3.71 (3.57 – 3.85)

Note: * adjusted for health scheme, sex, age, region, hospital level and diagnosis

Table 6. Factors influencing mortality rate outcomes among hospitalized, Thai, adult patients (Continued)

Variables	No. of patients (persons)	Mortality rate (%)	Crude odd ratio	Adjusted odd ratio* (95% CI)
Diagnosis				
A00-B99 Certain infectious and parasitic diseases	491,744	4.40	1.0	1.0
O10-O99 Childbirth and the puerperium	425,051	0.02	0.005	0.01 (0.01-0.01)
S00-T98 Injury, poisoning and certain other consequences of external causes	415,826	2.00	0.45	0.35 (0.34-0.36)
K00-K93 Diseases of the digestive system	413,453	2.35	0.53	0.30 (0.29-0.31)
J00-J99 Diseases of the respiratory system	327,010	6.41	1.46	0.99 (0.97-1.02)
I00-I99 Diseases of the circulatory system	310,522	8.72	1.98	0.90 (0.88-0.92)
N00-N99 Diseases of the genitourinary system	298,258	2.12	0.48	0.28 (0.27-0.29)
R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	196,018	0.98	0.22	0.20 (0.19-0.22)
C00-D48 Neoplasms	171,319	12.09	2.75	0.81 (0.79-0.83)
H00-H59 Diseases of the eye and adnexa	154,798	0.02	0.005	0.002 (0.001-0.002)
E00-E90 Endocrine, nutritional and metabolic diseases	150,917	1.32	0.30	0.22 (0.21-0.23)
M00-M99 Diseases of the musculoskeletal system and connective tissue	124,244	1.53	0.35	0.20 (0.19-0.21)
L00-L99 Diseases of the skin and subcutaneous tissue	94,094	1.99	0.45	0.34 (0.32-0.36)
F00-F99 Mental and behavioral disorders	70,044	0.25	0.06	0.04 (0.04-0.05)
G00-G99 Diseases of the nervous system	67,737	2.50	0.57	0.43 (0.41-0.45)
O00-O08 Pregnancy with abortive outcome	54,836	0.02	0.005	0.01 (0.01-0.02)
D50-D89 Diseases of the blood, blood-forming organs, certain disorders involving the immune mechanism	46,093	1.17	0.27	0.17 (0.15-0.18)
H60-H95 Diseases of the ear and mastoid process	31,041	0.04	0.009	0.01 (0.00-0.01)
Z00-Z99 Factors influencing health status and contact with health services	27,273	0.86	0.20	0.19 (0.17-0.22)
Q00-Q99 Congenital malformations, deformations and chromosomal abnormalities	4,535	0.97	0.22	0.14 (0.10-0.20)
Others	1,971	2.33	0.53	0.83 (0.61-1.12)
V01-Y98 External causes of morbidity and mortality	4	0.00	0.00	0.00 (0.00)
P00-P96 Certain conditions originating in the perinatal period	4	0.00	0.00	0.00 (0.00)

Note: * adjusted for health scheme, sex, age, region, hospital level and diagnosis

procedures.

The factors influencing mortality rates after adjusting for the level of care and disease groups were (a) the insurance system (UC, CSMBS, SSS =1.43, 1.0, 0.69, respectively) (b) sex (male to female = 1.0 to 0.72) (c) age (age > 80, 51-60, 19-30 years = 8.84, 3.27, 1, respectively) and (d) level of care (*i.e.,* community, general, tertiary, private hospital = 1.0, 6.48, 7.70, 3.71, respectively). These rates might simply be explained by a greater number of complications, more co-morbidities and/or a greater severity of disease among elderly patients and patients cared for at tertiary hospitals. Accident, trauma and certain malignancies (cancer of the lung and liver) trended to occur more in males than females; hence the difference in mortality between the sexes. Mortality rate differences among the three insurance systems are, however, multi-factorial and confounded and conclusions cannot be drawn without more detailed information and further study.

Conclusion

The UC provided coverage for 3,734,583 hospital admissions (76% of all admissions), while the CSMBS provided coverage for 615,954 admissions (12.7% of all) and the SSS for 513,398 admissions (10.56%). The community hospitals were the main healthcare providers for hospitalized adults accounting for 2,015,799 admissions or 41.4% of the total. The general, tertiary care and private hospitals served a respective 1,068,290 (22%), 1,329,756 (27.3%) and 450,094 admissions (9.3%). Infectious & parasitic diseases were the most common cause of admissions at all levels of care (316,227 admissions, 15.7%). Diseases of the digestive system were the most common cause of admissions to general hospitals (127,828 cases, 12.0%) while malignancy was the most common cause of admission to tertiary care hospitals (207,398 cases, 15.6%). Patients with congenital malformations, neoplasm, mental and behavioral disorders and diseases of the eye and adnexa were also primarily treated at tertiary care hospitals.

The mean and median hospital charges were highest in the CSMBS (26,668, 10,209 baht), followed by the SSS, (21,455, 9,713 baht) and the UC (13,086, 5,246 baht). The mortality rate averaged 4.4% in the CSMBS, 1.38% in the SSS and 3.32% in the UC. The factors influencing the mortality rate were male sex, elderly age, level of care and the insurance systems. A high mortality among patients under the UC needs a cautious interpretation as per the stated limitations of the present study; nevertheless, the issue requires further investigation. The present study does shed light on the feasibility of establishing a system for monitoring and evaluating the outcomes of health insurance at the national level. Methodological approaches in the present study can also serve as a starting point for quantifying the magnitude of the variation in process and outcomes in various dimensions.

Study limitations

One admission did not necessarily represent one patient because a single patient could be admitted several times due to chronicity and exacerbation of disease. The charges for each disease group was the average cost and this might not properly represent the severity of the individual patients and the procedures and medical instruments being used on/in each patient. The patients admitted under the UC and CSMBS tended to be older than patients under the SSS; so, the older age might have contributed to a higher cost and a higher death rate.

For interpretation of the higher mortality rate among the UC patients in the present study, major shortfalls come from the common limitations embedded in the nature of electronic databases. First, socio-economic status of individual patients plays an important role in accessibility to care that links to an onset of hospitalization, which in turn, affects prognosis of the patient outcomes. This type of personal information is typically not recorded in the electronic database; thus, it cannot be used for an adjusted comparison. Second, the cases referred from other hospitals for continuing care cannot be identified with precision, so they cannot be excluded or analyzed separately from the newly admitted cases (whose prognosis may be different). Third, the multivariate analysis in the present study did not account for disease severity due to incomplete data vis-a-vis comorbidity and complications. Lastly, contextual characteristics around healthcare providers that can influence the decision on resource use-such as (a) physician identification, specialties and experience and (b) hospital administration and policy-are not available in the databases and hence cannot be used for further adjustment. In addition to the major influence by provider payment methods, multiple factors affect variations in both practice and outcomes. These include, but are not limited to, better access to specialist care by the CSMBS beneficiaries residing mostly in urban areas as contrasted to the UC recipients living

mostly in rural/remote areas.

Acknowledgement

The authors wish to thank Mr. Bryan Roderick Hamman and Mrs. Janice Loewen-Hamman for assistance with English-language presentation of the manuscript.

Potential conflicts of interest

None.

Footnotes

[1] In November 2006, the UC beneficiaries in certain groups were no longer required to pay the 30-Baht copayment per visit or admission that has been imposed previously since the UC policy inception in 2001.

References

1. Tangcharoensathien V, Srithamrongsawat S, Pitayarangsarit S. Overview of health insurance systems. In: Pramualratana P, Wibulpolprasert S, editors. Health insurance systems in Thailand. Nonthaburi: Heath Systems Research Institute; 2002: 28-39.
2. International Statistical Classification of Diseases and Related Health Problems 10th Revision: ICD-10 Version: 2010 [Internet]. 2010 [cited 2012 May 22]. Available from: http://apps.who.int/classifications/icd10/browse/2010/en
3. Friedman B, De La Mare J, Andrews R, McKenzie DH. Practical options for estimating cost of hospital inpatient stays. J Health Care Finance 2002; 29: 1-13.
4. Kutzin J. Enhancing insurance functions of health system: a proposed conceptual framework. In: Nittayarumphong S, Mills A, editors. Achieving universal coverage of health care. Nonthaburi: The Office of Health Care Reform Project, Ministry of Public Health, Thailand; 1998: 27-101.
5. Tangchareonsathien V, Tantigate N, Kongsawat S. Reforming the civil servant medical benefit scheme: a case study BE 2538. Nonthaburi: Health Systems Research Institute, Ministry of Public Health, Thailand; 1997. (in Thai)
6. Tangchareonsathien V, Supachutikul A, Lertiendumrong J. The social security scheme in Thailand: what lessons can be drawn? Soc Sci Med 1999; 48: 913-23.
7. Department of Mental Health, Ministry of Public Health, Thailand. Community mental health Thailand country report 2008 [Internet]. 2008 [cited 2012 May 25]. Available from: http://www.aamh.edu.au/
8. Health and safety executive guide [Internet]. 2009 [cited 2012 May 28]. Available from: www.hse.gov.uk/pubns/web42.pdf.
9. Murray CJ. Quantifying the burden of disease: the technical basis for disability-adjusted life years. Bull World Health Organ 1994; 72: 429-45.

ผลกระทบของระบบประกันสุขภาพต่อการให้บริการด้านสุขภาพ: ข้อมูลจากการรักษาใน โรงพยาบาลปี พ.ศ. 2553

ศิริรัตน์ เรืองจุ้ย, ศิริลักษณ์ อนันต์ณัฐศิริ, จุฬาภรณ์ ลิมวัฒนานนท์, ยุพา ถาวรพิทักษ์, ปิยะลักษณ์ ภักดีสมัย, พิศาล ไม้เรียง

ภูมิหลัง: *เนื่องจากระบบประกันสุขภาพ สามระบบใหญ่ของประเทศไทยมีความแตกต่างกันในด้านการครอบคลุมบริการทางการแพทย์, กระบวนการเบิกจ่ายและชดเชยความเจ็บป่วย และสถานบริการสุขภาพที่ผู้ป่วยสามารถเข้าถึง จึงนำมาซึ่งคำถามวิจัยว่าการให้บริการสุขภาพของระบบประกันสุขภาพทั้งสามนี้มีความหลากหลายและแตกต่างกันมากน้อยเพียงใด และมีผลต่อผลลัพธ์ทางสุขภาพที่เกิดขึ้นแก่ผู้ป่วยอย่างไร*

วัตถุประสงค์: *เพื่อวิเคราะห์ผลกระทบของความแตกต่างในระบบประกันสุขภาพสามระบบ ต่อผลลัพธ์ด้านความเจ็บป่วยและการให้บริการทางสาธารณสุข ในประชากรไทยวัยผู้ใหญ่*

วัสดุและวิธีการ: *คณะผู้วิจัยได้วิเคราะห์ข้อมูลของผู้ป่วยที่เข้ารักษาในโรงพยาบาลด้วย 23 กลุ่มโรคหลัก ทั้งสามสิทธิ์การรักษาเกี่ยวกับอัตราการเสียชีวิต, ระดับของสถานพยาบาลที่ให้บริการ และค่าใช้จ่ายในการรักษาของแต่ละกลุ่มโรค การวิเคราะห์ปัจจัยที่มีผลต่อการเสียชีวิตใช้วิธีการถดถอยพหุโลจิสติกส์*

ผลการศึกษา: *ผู้ป่วยร้อยละ 41.4 ได้รับการรักษาในโรงพยาบาลชุมชน, ร้อยละ 22 ใน โรงพยาบาลทั่วไป, ร้อยละ 27.3 ในโรงพยาบาลตติยภูมิ และร้อยละ 9.3 ในโรงพยาบาลเอกชน โดยภาพรวมทั้งหมด กลุ่มโรคติดเชื้อเป็นสาเหตุที่ทำให้ผู้ป่วยเข้ารับการรักษาในโรงพยาบาลมากที่สุด เมื่อแยกระดับของโรงพยาบาล พบว่ากลุ่มโรคที่พบบ่อยที่สุดในโรงพยาบาลชุมชนได้แก่ โรคทางระบบทางเดินอาหาร ในขณะที่กลุ่มโรคมะเร็งเป็นสาเหตุที่ทำให้ผู้ป่วยเข้ารับการรักษาในโรงพยาบาลตติยภูมิมากที่สุด นอกจากนี้กลุ่มโรคอื่นๆ ที่พบบ่อยในโรงพยาบาลตติยภูมิ ได้แก่ ผู้ป่วยที่มีความพิการแต่กำเนิด , ความผิดปกติทางจิตและพฤติกรรม และโรคทางจักษุ*

ข้อมูลด้านค่าใช้จ่ายในโรงพยาบาล พบว่าสิทธิ์ข้าราชการมีค่าใช้จ่ายเฉลี่ยและค่ามัธยฐานมากที่สุด (26,668, และ10,209 บาท) รองลงมาได้แก่ สิทธิ์ประกันสังคม (21,455 และ 9,713 บาท) และสิทธิ์หลักประกันสุขภาพ(13,086 และ 5,246 บาท) ผลลัพธ์ด้านการเสียชีวิต พบว่ากลุ่มผู้ป่วยสิทธิ์ข้าราชการมีอัตราการเสียชีวิตร้อยละ 4.4, สิทธิ์ประกันสังคมร้อยละ 1.38 และสิทธิ์ประกันสุขภาพร้อยละ 3.32 อย่างไรก็ตาม เมื่อปรับปัจจัยอื่นๆ ที่มีผลต่อการเสียชีวิตให้เหมือนกัน พบว่ากลุ่มผู้ป่วยสิทธิ์ประกันสุขภาพมีอัตราการเสียชีวิต (odd ratio) เป็น 1.43 เท่า(95% CI 1.40-1.45) เมื่อเปรียบเทียบกับกลุ่มผู้ป่วยสิทธิ์ข้าราชการ นอกจากนี้พบว่า ปัจจัยอื่นๆ ที่มีผลต่อการเสียชีวิต ได้แก่ เพศชาย, อายุที่มากขึ้น และระดับของโรงพยาบาล

สรุป: *การศึกษานี้พบความแตกต่างของค่าใช้จ่ายสำหรับบางกลุ่มโรค และผลลัพธ์ทางคลินิก ระหว่างระบบประกันสุขภาพ แม้ว่าการแปลผลความแตกต่างของผลลัพธ์ทางคลินิกมีข้อจำกัดที่การศึกษานี้ไม่มีข้อมูลเกี่ยวกับเศรษฐานะทางสังคมและเศรษฐกิจ รวมทั้งระดับความรุนแรงของโรคอย่างไรก็ตามการศึกษาเพิ่มเติมเพื่อหาคำอธิบายที่สิทธิ์การรักษาหลักประกันสุขภาพ มีความสัมพันธ์กับความเสี่ยงที่จะเสียชีวิตมากกว่ากลุ่มอื่นเป็นเรื่องที่มีความสำคัญอย่างเร่งด่วน*