Comparative Effectiveness of Three National Healthcare Schemes in Thailand: In-hospital Medical Expenses for Diabetes and Hypertension in 2010

Piyatat Tatsanavivat MD*,
Yupa Thavornpitak MSc**, Chatlert Pongchaiyakul MD*

* Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand
** Department of Biostatistics and Demography, Faculty of Public Health, Khon Kaen University, Khon Kaen, Thailand

Objective: To compare the health insurance schemes regarding treatment of diabetes (DM) and hypertension (HT).
Material and Method: In-patient expense data for all ICD-10 DM and HT for 2010 were accessed from the National Health Security Office (UC), the Social Security office (SS) and the Civil Servants Benefit System (CSMBS). Mean hospital stay, charges and mortality rates were calculated and compared across schemes and types of hospital.
Results: Thais ≥ 19 years accounted for 4,863,939 admissions (12.6% DM-All; 17.9% HT-All). Average admission per case was higher for DM-All (1.66) than HT-All (1.46). CSMBS patients trended to be older than UC and SS. Most under UC were admitted to primary care (51.9% DM-All; 50.0% HT-All) vs. tertiary under CSMBS (45.5% DM-All; 48.4% HT-All). Median of stay under CSMBS was longer (1.3-2.0x) and charges higher (1.3-1.6x) than UC for all levels for both DM and HT. Mortality rate under CSMBS was higher than UC in primary care for both DM and HT, while respective rates were higher under UC than CSMBS for secondary (DM-All: 9.9 vs. 8.1; HT-All: 8.2 vs. 6.6) and tertiary care (DM-All:11.7 vs.8.6; HT-All: 9.8 vs. 6.8).
Conclusion: Inequalities among three health insurance schemes for DM and HT including hospital charge, hospital stay and mortality rate according to health care settings for DM and HT were shown, effectiveness improvement is needed.

Keywords: Diabetes, Hypertension, Health economy, Health insurance, Thailand

Diabetes mellitus (DM) and hypertension (HT) are both common chronic diseases in Thailand, requiring continuing medical care. The estimated national prevalence of DM in Thai adults (age ≥ 20 years) is 7.5%[1], while that of HT is 22.1% for the 40-69 year age range)[2]. The hospitalization rate for DM in Thailand has been trending upward, from 33.3 per 100,000 population in 1985 to 91.0, 380.7, 586.8 and 736.5 in 1994, 2003, 2006 and 2009, respectively. A similar trend has been observed for HT, from 261.6 per 100,000 population in 1999 to 477.4 and 981.5 in 2004 and 2009, respectively. Thailand is therefore moving inextricably toward a greater public health burden because of these two problems[3].

In the Thai healthcare system, three main public health insurance schemes (HIS) provide coverage for ~96% of the population[4], viz., (a) the Social Security Scheme (SS), implemented in 1990[5], covers ~10 million workers in the non-government sector (b) the Civil Servant Medical Benefits Scheme (CSMBS) covers ~5 million (8%) civil servants and their dependents and (c) the Universal Coverage (UC) Scheme, implemented in 2002, covers almost all the remaining population (45 million or >75%). Claims of inequalities of healthcare have been made over the last decade resulting in persistent calls for a rethinking of national health policy. At the 10th Anniversary of Thailand's Universal Health Insurance Conference a plan was announced (March 22, 2012) to align (standardize and integrate) the three National Health Insurance Funds[6].

There are variety of health inequality factors, irrespective of socioeconomics, politics and development[7-9]. The implementation of national health insurance is a national policy but since resources are constrained, all stakeholders (healthcare providers, policy-makers and government) must evaluate the effectiveness of the implemented healthcare scheme (s); in order to know what is working, where there are

Correspondence to:
Tatsanavivat P, Department of Medicine, Faculty of Medicine Khon Kaen University, Khon Kaen 40002, Thailand.
Phone: 043-363-664, Fax: 043-202-491
E-mail: Pyatat@kku.ac.th

efficiencies or inefficiencies and where changes need to be made for the benefit of patients, caregivers and the government/insurance scheme (s).

A strategy to demonstrate whether healthcare inequalities exist is to analyze the existing in-hospital database for common health problems, particularly DM and HT. The healthcare costs of the latter are high due to their (a) high prevalence (b) chronicity (c) common recurrent long-term complications (many of which need hospitalization) and (d) prescribed medications. Due to the high cost of these services, the actual prescribed treatment could be different, resulting in discrepancies in treatment and accessibility among the health insurances schemes. Moreover, DM and HT are well-established major risks for cardiovascular, stroke and chronic kidney diseases and outcome predictors. For decades, these health problems have ranked among the top ten burden of diseases and DALY (disability-adjusted life year) in Thailand[10].

The present study was designed to determine and compare the effectiveness of the three HIS in Thailand, using the DM/HT admission data (for hospital charges, length of stays and mortality rates) for the fiscal year 2010.

Material and Method

Data were derived from the in-patient medical expense forms for the fiscal year 2010 (October 1, 2009 to September 31, 2010) from the National Health Security Office (NHSO); the Social Security (SS) office, Thailand; and, in-patient data from the Civil Servants Benefit System (CSMBS) from the Comptroller General's Department. A data analysis team verified the quality of the data quality by checking for (a) overlapping informations (b) visiting dates (c) missing items (d) incorrect coding and (e) the correct fiscal year.

The definitions of DM and HT followed the WHO International Classification of Diseases and related health problems 10th revision (ICD-10), 2007 [11]; DM (E10-E14) HT (I10-I15) were used. All district hospitals and hospitals with < 200 beds were defined as the primary hospital level; provincial hospitals and hospitals with 200-300 beds were defined as the secondary level; while the tertiary level included all regional hospitals, university hospitals and special care hospitals or hospital with > 300 beds. All admissions with DM (DM-ALL) or HT (HT-All)-as either the primary or secondary or both in the discharge diagnoses-were included for the analysis. Data were retrieved and analyzed for mean length of hospital stays (LOS) and hospital charges (HC) per admission (in Thai currency-

Baht). Since one patient might have several admissions, the number of patients was retrieved and the mortality rate analyzed. The LOS, HC and mortality rates were demonstrated according to three national health insurance schemes (HIS), types of hospital care services (HCS; primary, secondary, tertiary or private hospitals). Statistical analyses were performed using SPSS program for Windows V.17.

Results

In 2010, 4,863,939 hospital admissions of persons aged 19 and older were covered by one of the three HISs. DM-All and HT-All represented a respective 12.6% (615,149) and 17.9% (869,416) of the total diagnoses at discharge. Importantly, 370,270 with DM-All and 596,971 HT-All patients were responsible for 615,149 and 869,416 admissions, respectively. The average admission per case was higher for DM-All than for HT-All (1.66 vs. 1.46, respectively).

Among the HIS, patients in the CSMBS averaged older than in either the UC or SS. Three-fourths of both disease groups were covered by the UC (76.6% DM-All vs. 73.5% HT-All). The majority of UC admissions (51.9% DM-All vs. 50.0% HT-All) were admitted to primary hospital care. By contrast, the majority of those covered under the CSMBS were admitted to tertiary care (45.5% DM-All vs. 48.4% HT-All), while two-thirds of those covered under SS were admitted to private hospitals (Table 1 & 2).

Length of stay (LOS) and hospital charges (Table 3)

The medians of length of stay of all health insurance types for DM-All and HT-All were similar, ranged between 2-5 days. The respective medians of hospital charges per admission of all health insurance types for DM-All and HT-All ranged between 3,986-20,784 and 3,526-22,000 Baht. Compared to the UC, the CSMBS had a 1.3-2.0 times longer hospital stay and 1.3-1.6 times higher hospital charges for both DM and HT in all primary, secondary and tertiary hospitals. In private hospitals, despite shorter LOS, charges per admission under the UC were slightly higher than the SS and 2-fold higher when compared with the CSMBS.

Mortality rate under UC vs. CSMBS (Table 4)

The respective range of case mortality rates for CSMBS vs. UC in (a) primary (b) secondary (c) tertiary and (d) private hospital care were (a) 2.4 vs.1.4 (b) 8.1 vs. 9.9 (c) 8.6 vs. 11.7 and (d) 4.9 vs. 7.1 for DM-all; and (a) 1.9 vs. 1.2 (b) 6.6 vs. 8.2 (c) 6.8 vs. 9.8 and (d) 5.7 vs. 5.9 for HT-all. In primary care, the mortality rate

Table 1. Distribution of DM/HT diagnosis and mean ages by health insurance scheme

Insurance scheme	DM			HT		
	Admission (%)	Case (%)	Mean Ages (SD)	Admission (%)	Case (%)	Mean Ages (SD)
Total	615,149 (100)	370,270 (100)	63.0 (12.6)	869,416 (100)	596,971 (100)	65.9 (13.1)
CSMBS	116,861 (18.9)	72,789 (19.6)	68.7 (11.2)	189,678 (21.8)	131,731 (22.1)	70.4 (11.6)
SS	28,159 (4.5)	19,093 (5.2)	49.3 (10.5)	41,189 (4.7)	31,320 (5.2)	49.2 (10.7)
UC	471,129 (76.6)	278,388 (75.2)	62.5 (12.2)	638,549 (73.5)	433,920 (72.7)	65.7 (12.7)

CSBMS: Civil Servants Benefit System, SS: Social Security office, UC: National Health Security Office

Table 2. Proportion of admission distribution by levels of hospital and health care schemes (DM 615,149 admissions, HT 869,416 admissions)

Hospital services	CSMBS		SS		UC	
	DM (%)	HT (%)	DM (%)	HT (%)	DM (%)	HT (%)
Total (admission)	116,861	189,678	28,159	41,189	470,129	638,549
Primary	31.9	29.7	2.0	2.0	51.9	50.0
Secondary	22.4	21.7	14.5	12.7	20.4	19.8
Tertiary	45.5	48.4	23.5	22.9	22.4	24.5
Private	0.2	0.2	60	62.4	5.3	5.6

CSBMS: Civil Servants Benefit System, SS: Social Security office, UC: National Health Security Office

of both diseases under UC were lower than for CSMBS (DM-All: 1.4 vs. 2.4; HT-All: 1.2 vs. 1.9), but higher in secondary care (DM-All: 9.9 vs. 8.1; HT-All: 8.2 vs. 6.6) and tertiary care (DM-All: 11.7 vs. 8.6; HT-All: 9.8 vs. 6.8). Patients under SS had a lower mortality at all health care levels, probably because they were mostly in working and younger age groups.

Discussion

The analysis of medical expenses information for DM & HT collected from the three national HISs revealed several interesting findings. Firstly, it underscored that DM and HT are common, major, in-patients care, health burdens, as about one in every eight (12.6%) admissions had DM and one in every six (17.9%) had HT as either a primary or secondary discharge diagnosis. Relatedly, obesity and metabolic syndromes-the commonly associated risks of DM and HT-are increasing in Thailand[12] as well as globally[13]. As many of the related risks and prognostic factors could be modified through individual life-style modifications and better care quality, especially at primary health care level. Large magnitude of hospitalization can be avoided or lessen when health promotion and prevention on DM/HT are properly implemented. The current magnitude and increasing

cluster trends of these cardiovascular morbidities and mortality risk factors accentuate the need for medical educators to emphasize DM/HT, metabolic syndromes, obesity and their related complications and co-morbidities in medical education. In addition, public awareness needs to be increased regarding the costs of these health burdens in order that health policy and public collaboration can be coordinated in prevention and health promotion.

Secondly, the inequality of healthcare accessibility by the existing HISs was clearly evidenced. As in other middle and lower income countries evidence of comparative effectiveness is needed so as to avoid over-exploitation of limited fiscal and personnel resources. These findings in the Thai context serve as clear evidence for the need of comparative effectiveness between and among the HISs. The evidence serves (a) to reiterate and inform clinicians and policy-makers of the existing inequality among the HISs and (b) to supportively assist their making informed decisions that will improve healthcare and health education throughout the nation[14].

Thirdly, it was demonstrated that for both DM-All and HT-All admissions to all levels of healthcare, the CSMBS had (a) longer LOSs (b) higher hospital charges per admission than UC (c) a mortality

rate higher at the primary care level and (d) a lower mortality rate than UC at both the secondary and tertiary levels. Since, this is a cross-sectional data, no attempt to use comorbidity index to adjust for comparing mortality across all HIS. These findings need careful interpretation, and could incorrectly mean that a lower hospital mortality resulted from a longer LOS and higher cost of care resulting in better care outcomes, when improperly communicate, this could result in more wasteful use of limited available health care resources. In fact, there are several factors including the health-seeking behavior and doctors' clinical decision making, to explain this paradigm.

Differences in health-seeking behavior among patients in the different HIS[15] may be attributable to the higher mortality among UC patients than CSMBS ones. Since CSMBS patients were/are civil servants having more job security, they may be more likely to access healthcare at an early stage of disease without worrying about losing income; by contrast, the majority of patients under UC were/are farmers, shop- or small-business owners who cannot afford to miss work. Although medical services are 'free', having an illness is a burden on household financial status-through loss of earning capability and increased expenses for indirect costs (*i.e.*, transportation, accommodation and foods for accompanying relatives). UC patients may, therefore, be inclined to postpone visiting a doctor until a late or severe stage of disease, particularly when they may need to be referred to secondary or tertiary care. In this instance, the outcome of care is expected to be poor, as seen in the comparison of the UC and CSMBS data.

Despite control measures implemented in the HISs to reduce healthcare costs through capitation and case-based payment, increased use of generic medicines, and improved diagnosis and treatment[16] hospital charges have remained high. Important factors could include (a) a lack of societal recognition of healthcare decision-making priorities (*i.e.*, triaging) (b) inadequate resource allocation despite available economic evaluation information among policy-makers, healthcare professionals and academicians[17] (c) the influence of hospital or healthcare-provider payment arrangement on the clinical decision-making behavior of doctors and/or (d) industrial efforts to increase drug and medical device sales through promotional activities. All of these factors could 'force' unnecessary or wasteful diagnoses, prescriptions and/or treatments, resulting in higher hospital charges, particularly in the CSMBS, as was previously demonstrated vis-a-vis

statin use, a lipid-lowering medication[18] and up to 30-100% higher cost of drugs than are available to subscribers of the UC[19].

Notwithstanding times of (a) economic restraint (b) an aging demographic (c) an increase in chronic diseases and (d) the availability of new and more expensive treatments, the public is demanding access to high-quality, affordable care. The need for wise, evidence based decisions on policy are needed. In order to improve service coverage and protection against financial risk for the nation, improving efficiencies and reducing expenditures are important measures to consider. Other useful policy tools would include (a) improved national procurement practices (b) broader use of generic products (c) better incentives for service providers and (d) streamlined financing and administrative procedures[20].

Limitations

The present findings must be interpreted in the context of a number of potential strengths and weaknesses. Since the present study used the overall admission data of the three major health insurance schemes of Thailand for a single year, the findings reflect simple hospital admissions. Since this study focused broadly on two major health problems with very limited clinical parameters, more evidence should probably be identified for a more holistic consideration of the impacts on healthcare policy and medical education decision making.

The main weaknesses of this study are (a) the retrospective nature of the data collection with limited service-based data (b) single year, cross-sectional data cannot reflect trends beyond what is being identified (c) more than one admission for each patient, who may have had several co-morbidities at the time of admission and death. Thus, the findings need to be interpreted with caution and further study is clearly needed.

In addition, Thailand is well-recognized for leading health-financing reforms in order to achieve universal coverage[16]. On-going efforts to standardize the health insurance schemes are therefore being made at a political level to address the inequality gap and standardize healthcare coverage. Thus, the findings in this study should be considered a snapshot after just two years of implementation to give politicians and policy-makers an idea of possible trends and solutions.

Conclusion

The current study demonstrated an inequality in service provision among the health insurance

Table 3. Compare medians of length of hospital stays (LOS) and average hospital charge per admission (HC) in the same hospital care levels by insurance schemes, using the UC as base of comparison

Hospital services	Insurance scheme	Length of hospital stay				Hospital charges per admission			
		DM (day) (IQR)	/UC	HT (day) (IQR)	/UC	DM (Baht) (IQR)	/UC	HT(Baht) (IQR)	/UC
Primary	CSMBS	4 (3-6)	1.3	4 (3-6)	2	5,121 (3,054-9,318)	1.3	4,662 (2,743-8,638)	1.3
	SS	5 (3-7)	1.7	4 (3-7)	2	8,047 (4,447-15,690)	2	7,835 (3,854-17,790)	2.2
	UC	3 (2-5)	1	2 (1-4)	1	3,986 (2,490-6,827)	1	3,526 (2,187-6,026)	1
Secondary/ tertiary	CSMBS	5 (3-10)	1.3	5 (3-10)	1.7	17392 (7,901-37,620)	1.6	17,742 (7,954-39,028)	1.6
	SS	4 (3-8)	1	4 (3-7)	1.3	9,274 (4,400-20,339)	0.8	9,243 (4,036-20,914)	0.8
	UC	4 (2-7)	1	3 (2-7)	1	11,063 (5,426-21,966)	1	10,890 (5,404-21,826)	1
Private	CSMBS	5 (3-9)	2.5	4 (3-8)	2	10,312 (5,642-19,397)	0.5	9,396 (5,489-19,295)	0.4
	SS	4 (3-6)	2	3 (2-6)	1.5	18,505 (9,388-40,252)	0.9	16,940 (8,423-37,218)	0.8
	UC	2 (1-5)	1	2 (1-5)	1	20,784 (9,138-34,148)	1	22,000 (9,088-36,232)	1

CSBMS: Civil Servants Benefit System, SS: Social Security office, UC: National Health Security Office, IQR: interquartile range, /UC: ratio of CSMBS/UC or SS/UC

Table 4. Mortality rate (%) of number of admission and number of case counts, comparing between HIS (excluding SS-due to younger age group) for each level hospital care services

Hospital services	Insurance scheme	DM-All (%)		HT-All (%)	
		Admission mortality rate	Case Mortality rate	Admission mortality rate	Case Mortality rate
Primary	CSMBS	1.2	2.4	1.1	1.9
	SS	1.6	2.3	1.5	1.9
	UC	0.8	1.4	0.8	1.2
Secondary	CSMBS	5.2	8.1	4.7	6.6
	SS	2.2	3.1	1.8	2.2
	UC	6.2	9.9	5.9	8.2
Tertiary	CSMBS	6	8.6	5.1	6.8
	SS	3.5	4.9	3.2	4.1
	UC	7.1	11.7	6.7	9.8
Private	CSMBS	3.1	4.9	3.8	5.7
	SS	2.1	3.1	1.6	2.2
	UC	4.3	7.1	3.9	5.9

CSBMS: Civil Servants Benefit System, SS: Social Security office, UC: National Health Security Office

schemes in Thailand for DM and HT. It emphasized the magnitude of burden in hospital admissions for the two diseases and therefore provides useful information for decision-making by healthcare policy-makers, providers and medical educators; in order that they may together work to provide more equitable services and adjust medical curriculum appropriately.

Potential conflicts of interest

None.

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การเปรียบเทียบประสิทธิผลของระบบการประกันสุขภาพสามระบบของประเทศไทย โดยใช้ข้อมูลส่งเบิกจ่ายจากระบบประกันจากการนอนโรงพยาบาลในปี พ.ศ. 2553 ของภาวะที่มีโรคเบาหวานและความดันโลหิตสูง

ปิยทัศน์ ทัศนาวิวัฒน์, ยุพา ถาวรพิทักษ์, ฉัตรเลิศ พงษ์ไชยกุล

วัตถุประสงค์: *เพื่อเปรียบเทียบประสิทธิผลในการดูแลโรคเบาหวานและความดันโลหิตสูงในโรงพยาบาลระหว่างสามระบบประกันสุขภาพของประเทศ ในประเด็นระยะเวลาการนอนโรงพยาบาล ค่าส่งเบิกจ่ายและอัตราการเสียชีวิต*

วัสดุและวิธีการ: *โครงการวิจัยได้ใช้ข้อมูลการเจ็บป่วยของผู้ป่วยใน ที่ได้รับการวินิจฉัยเป็นโรคเบาหวาน(DM-All) หรือความดันโลหิตสูง (HT-All) ทั้งที่ปรากฏเป็นการวินิจฉัยโรคหลัก และการวินิจฉัยโรครอง ตามคำจำกัดความของ WHO ICD-10, 2007 และข้อมูลการเสียชีวิตในโรงพยาบาล(นับเป็นรายคน)โดยใช้ข้อมูล ที่โรงพยาบาลส่งเบิกจ่ายจากระบบประกันสุขภาพถ้วนหน้า (UC), ระบบประกันสังคม (SS) และระบบสวัสดิการรักษาพยาบาลข้าราชการ (CSMBS) ในปีงบประมาณปี พ.ศ. 2553 หลังจากการตรวจสอบคุณภาพของข้อมูลแล้ว จากข้อมูลวินิจฉัยจำหน่ายจากโรงพยาบาลได้วิเคราะห์ หาค่าเฉลี่ยของระยะเวลาการนอนโรงพยาบาล ค่าส่งเบิกจ่ายต่อการนอนโรงพยาบาลในแต่ละครั้ง และอัตราการเสียชีวิต รวมทั้งเปรียบเทียบระหว่างระบบประกันสุขภาพ และระดับโรงพยาบาลบริการ*

ผลการศึกษา: *ประชากรกลุ่มอายุครบ19 ปีขึ้นไป มีจำนวนการนอนโรงพยาบาลทั้งหมด 4,863,939 ครั้ง และร้อยละ 12.6 และ 17.9 ของการนอนโรงพยาบาล เป็น DM-All และ HT-All ตามลำดับ ในหนึ่งปีDM-All มีอัตราเฉลี่ยนอนโรงพยาบาล 1.66 ครั้งต่อราย ในขณะที่ HT-All 1.46 ต่อราย ผู้ป่วยในระบบCSMBS มีอายุสูงกว่าระบบอื่น สัดส่วนการนอนโรงพยาบาลในระบบ UC ส่วนใหญ่อยู่ที่โรงพยาบาลระดับปฐมภูมิ(ร้อยละ 51.9 สำหรับ DM-All และร้อยละ 50.0 สำหรับ HT-All)ในขณะที่ ในระบบ CSMBS สัดส่วนส่วนใหญ่อยู่ที่โรงพยาบาลระดับตติยภูมิ (ร้อยละ 45.5 สำหรับ DM-All และร้อยละ 48.4 สำหรับHT-All)ค่ามัธยฐานของระยะเวลาการนอนโรงพยาบาล และค่าส่งเบิกของทั้งสองโรค ในระบบ CSMBS สูงเป็น 1.3-2.0 เท่า และ 1.3 -1.6 เท่า ของระบบ UC ตามลำดับ ในทุกระดับการบริการของโรงพยาบาล อัตราการเสียชีวิตของทั้งสองโรคในโรงพยาบาลระดับปฐมภูมิของระบบ CSMBS สูงกว่าระบบ UC สำหรับอัตราการเสียชีวิตทั้งสองโรคในระบบ UC จะสูงกว่าระบบ CSMBS ทั้งในโรงพยาบาลระดับทุติยภูมิ(DM-Allร้อยละ 9.9 เทียบกับ 8.1 และ HT-Allร้อยละ 8.2 เทียบกับ 6.6) และตติยภูมิ(DM-Allร้อยละ 11.7 เทียบกับ 8.6 และ HT-All ร้อยละ 9.8 เทียบกับ 6.8)*

สรุป: *การศึกษานี้ได้แสดงให้เห็นถึงความไม่เท่าเทียมของระบบประกันสุขภาพทั้งสามระบบใน ด้านค่าใช้จ่ายระยะเวลานอนโรงพยาบาล และอัตราการเสียชีวิตในโรงพยาบาลระดับต่างๆ สำหรับการบริการแก่ผู้ป่วยโรคเบาหวานหรือความดันโลหิตสูงในประเทศไทย ซึ่งต้องการแนวทางการปรับปรุงเพื่อให้มีประสิทธิภาพมากขึ้นต่อไป*