Mortality Risks of Pneumonia Patients with Different Levels of Health Insurance Coverage in Thailand

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Abstract :

***Objective* :** **To compare mortality risks of pneumonia patients with different levels of health insurance coverage.**

***Design* :** **Retrospective cohort study**

Sample : **Pneumonia patients admitted to hospitals owned by the Ministry of Public Health (MOPH) of Thailand in 1999.**

***Results* :** **Of the 3,725,847 patients admitted to the Thai Ministry of Public Health hospitals, 73,560 patients were diagnosed with a type of pneumonia. Patients with differences in the level of health insurance coverage had significantly different mortality risks. Compared to patients under the Thai government Low Income Scheme, patients with higher levels of health insurance coverage were significantly more likely to have lower mortality risks, such as those patients who had the ability to pay their health service cost (OR = .73, p < .001), those who were in the civil servant medical benefit plan (OR = .51, p < .001), or those who were under another MOPH health insurance coverage plan such as health volunteers (OR = .48, p = .003) after controlling for age, gender, marital status, hospital types, and length of stay.**

***Conclusion* :** **Pneumonia patients who had lower levels of health insurance coverage had a significantly higher mortality risk than those of insured or self-insured patients. Whether the results reflected unmeasured differences in quality of care, restricted or delayed to access to care, or differences in comorbidities remains to be determined.**

***Key words* :** Pneumonia, Health insurance, Mortality risk, Thailand

เรื่องย่อ : **ความเสี่ยงต่อการตายของผู้ป่วยโรคปอดบวมที่มีสถานภาพการประกันสุขภาพที่ต่างกันในประเทศไทย**

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วัตถุประสงค์ เพื่อเปรียบเทียบความเสี่ยงต่อการตายของผู้ป่วยโรคปอดบวมที่มีสถานภาพการประกันสุขภาพที่ต่างกัน

รูปแบบการวิจัย โคฮอร์ท แบบเก็บข้อมูลย้อนหลัง

ตัวอย่าง ผู้ป่วยในโรคปอดบวมในโรงพยาบาลสังกัดกระทรวงสาธารณสุขปี 2542

ผลการวิจัย จากผู้ป่วยในทั้งหมดจำนวน 3,725,847 คนที่มารับการรักษาในโรงพยาบาลสังกัดกระทรวงสาธารณสุข มีผู้ที่ป่วยเป็นโรคปอดบวมจำนวน 73,560 คน ผลการศึกษาพบว่าผู้ป่วยที่มีสถานภาพการประกันสุขภาพที่ต่างกันมีความเสี่ยงต่อการตายต่างกัน ทั้งนี้พบว่าเมื่อเปรียบเทียบกับผู้ป่วยที่มีบัตรสงเคราะห์ประชาชนผู้มีรายได้น้อย ผู้ป่วยกลุ่มอื่น ๆ เช่น ผู้ป่วยที่ชำระค่ารักษาพยาบาลเอง (OR = .73, p < .001) ผู้ป่วยที่เป็นข้าราชการ (OR = .51, p < .001) และผู้ป่วยที่มีการประกันสุขภาพแบบอื่น ๆ (OR = .48, p = .003) มีความเสี่ยงต่อการตายน้อยกว่าอย่างมีนัยสำคัญทางสถิติ หลังจากควบคุมตัวแปรเรื่อง อายุ เพศ สถานภาพการแต่งงาน ประเภทโรงพยาบาล และระยะเวลาในการอยู่ในโรงพยาบาลแล้ว

อภิปราย ผลการวิจัยที่พบว่าผู้ป่วยที่ใช้บัตรสงเคราะห์ประชาชนผู้มีรายได้น้อยมีความเสี่ยงต่อการตายมากกว่าผู้ป่วยที่มีสถานภาพการประกันสุขภาพแบบอื่น ๆ อย่างมีนัยสำคัญ หลังจากควบคุมตัวแปรต่าง ๆ แล้ว ในครั้งนี้ยังไม่สามารถบอกได้ว่าความเสี่ยงในการตายที่ต่างกันนี้เป็นเพราะคุณภาพการรักษาพยาบาลที่ต่างกัน การที่ผู้ป่วยมารับการรักษาพยาบาลเร็ว/ช้าต่างกัน จากโรคต่าง ๆ ที่เป็นร่วม หรือจากสาเหตุอื่น ๆ

INTRODUCTION

Studies have suggested that patients with lower socioeconomic status or lack of health insurance were more likely to have a higher mortality rate or worse outcomes than privately insured or self-insured patients.[1-6] The relationship of low economic status to worse treatment outcomes was also found in patients affiliated with fee-for-service treatments compared to those of insured patients.[7]

People with different socioeconomic status in Thailand have different levels of health insurance coverage. Some have private insurance. Some are under the Thai health care policy with different health care coverage levels. For the poor people, the Thailand government has provided coverage of all health care services with some limitations. However, there are few studies focused on treatment outcomes among people with different levels of health insurance coverage, especially with pneumonia patients in Thailand.

We conducted a study of pneumonia cases in 808 Ministry of Public Health (MOPH) hospitals (716 district, 67 general, and 25 regional hospitals) in Thailand in which we determined the relationship between levels of health insurance coverage status and mortality risk.

MATERIALS AND METHODS

Subjects

The study sample was retrospectively retrieved from the diagnosis related group (DRG) database of the MOPH of Thailand. The database consisted of all patients admitted to all of the MOPH hospitals in 1999. The database was created annually to serve the purpose of management of the Thai health care system based on the DRG method. Data of 3,725,847 inpatients admitted to MOPH hospitals was available in the database, of which 96,771 subjects were diagnosed with a type of pneumonia based on ICD-10 (International Classification of Disease, tenth revision).[8] Only data of subjects who had a diagnosis of pneumonia with ICD-10 of J10.0, J11.0, J12.0 - 12.9, or J13 - J18.9 were used for this study. Due to missing values of some variables, the final study cohort consisted of 73,560 patients.

Study variables

The main variable of interest was mortality risk. Independent variables potentially associated with the main variable included gender, age, marital status, type of hospital, length of hospital stay (LOS), and level of health insurance coverage.

The main variable, mortality, was defined as "dead" if the subjects' discharge type was either "dead autopsy" or "dead non-autopsy". Otherwise, the variable was defined as "alive". The marital status was defined as "married" if subjects were married. The variable was defined as "single" if they were either "single", "separated", "divorced", "widowed", or "priest". The type of hospital variable was divided into 3 types – district hospital (<150 beds), general hospital (150-500 beds), and regional hospital (> 500 beds).

The level of health insurance coverage variable was divided into 5 levels. Level 1(fully pay) consisted of subjects who could pay off their medical cost fully. Some of these patients had private insurance and some did not. These patients were usually rich. They could go to any hospital they wanted without any limitation to health care services. Level 2 (insured) consisted of subjects who had some types of government insurance, such as those who were under the Thai government Civil Servant medical benefit plan, Social Security benefit plan, and car accident insurance. For this group of subjects, either the government or an insurance company paid the hospital for all health care service costs. For the patients who were under the Thai government Civil Servant medical benefit plan or car accident insurance, they could go to any hospital they wanted without any limitation to health care services. However, the patients who were under the Social Security benefit paln had to go to a hospital selected by the company they worked for first. Then, if the hospital could not handle the case, the patient would be referred to a higher-level hospital. Level 3 (MOPH policy) consisted of subjects who received free medical services under the MOPH policies, such as subjects who were health volunteers, community leaders, elderly, children under 12 years old, disables, priests, and veterinary. They would receive free medication if the medicines were listed in the National Essential Drug List. Level 4 (partially pay) consisted of subjects who did not have enough money to pay all of their medical service costs. They partially paid for their medical service costs. Usually, based on individual hospital's policy, physicians authorized these patients to not having to pay for the total cost of the medical services. Level 5 (LIS) consisted of subjects who were under the Thai government Low Income Scheme (LIS). The patients is qualified for the LIS program if their income is less than 2,000 Baht per year (about 50 US dollars). In general, the LIS program is quite similar to the Medicaid Program in the United States. The subjects got completely free medical services. However, they got free medication if the medicines were listed in the National Essential Drug List. For medicines that were not listed in the national essential drug list, the LIS subjects received them with some limitations based on an individual hospital's policy. In addition, they could not go to a higher-level hospital directly without passing through the referral system except in an emergency.

Statistical analysis

We summarized the data for each controlling variable using percentages for categorical variables and means with standard deviations for continuous variables. We compared the characteristics of patients with different levels of health insurance coverage (5 levels) using the chi-square statistic for categorical data. For continuous data, we used univariate analysis of variance. Scheffe post hoc comparisons were performed to determine mean differences if the ANOVA tests were significant. Since the main variable (mortality) was a binary variable, we used the logistic regression model to test the association of the variable with independent variables. Confidence intervals (CIs) for the estimated odds ratio (ORs) and significance tests from the null value were calculated. Tests for possible interactions among independent variables were performed. The p value was set at .05. All analyses were performed using the SPSS for Windows version 10.01 computer program.

RESULTS

There were 96,771 subjects diagnosed with pneumonia. However, due to missing values, there were only 73,560 subjects included in the analysis. General characteristics of subjects in each group of

subjects with different levels of health insurance coverage are shown in Table 1. Number of subjects in each level varied due to missing data. Mean age and LOS were significantly different among the groups. Subjects with levels 1 (fully pay), 3 (MOPH policy), and 4 (partially pay) had lower mean age compared to the other levels. Gender was also significantly different among groups. Subjects in level 5 (LIS) were less likely to be female than in other levels. In addition, there was a significant difference among subjects' marital status. In accordance with subjects' mean age, subjects in level 1 (fully pay), 3 (MOPH policy), and 4 (partially pay) were significantly more likely to be single. Moreover data indicated that the majority of subjects in level 3 (MOPH policy), 4 (partially pay), and 5 (LIS) were more likely admitted in a district hospital. Significantly, subjects in level 2 (insured) had longer LOS than those in other levels. In addition, subjects in level 5 were more likely to die in a higher proportion than in other groups.

Table 1. Demographic and clinical characteristics of study patients according to levels of health insurance coverage.

Characteristics	Level 1 (Fully pay) (N = 11,979)	Level 2 (Insured) (N = 10,006)	Level 3 (MOPH) policy) (N = 50,865)	Level 4 (Partially pay) (N = 301)	Level 5 (LIS) (N = 3,755)
Demographic variables					
Age (years) (Mean ± SD)	21.9 ± 27.8	36.6 ± 27.3	19.3 ± 29.9	17.7 ± 27.0	36.1 ± 21.2
Gender (No.,%)					
Male	6,653 (55.8)	5,044 (50.4)	27,534 (54.4)	167 (56.2)	1,860 (49.9)
Female	5,264 (44.2)	4,960 (49.6)	23,124 (45.6)	130 (43.8)	1,867 (50.1)
Marital status (No.,%)					
Married	3,451 (29.6)	5,379 (55.0)	9,738(19.5)	70 (23.8)	2,388 (65.6)
Single	8,277 (70.4)	4,394 (45.0)	40,077 (80.5)	224 (76.2)	1,253 (34.4)
Hospital types (No.,%)					
District (≤ 90 beds)	3,959 (33.1)	3,325 (33.1)	2,557 (50.3)	230 (76.4)	2,166 (58.2)
General (91 – 999 beds)	3,977 (33.2)	4,236 (42.1)	15,859 (31.2)	68 (22.6)	996 (26.8)
Regional (≥1,000 beds)	4,042 (33.7)	2,497 (24.8)	9,437 (18.6)	3 (1.0)	560 (15.0)
LOS (days) (Mean ± SD)	5.6 ± 11.2	6.9 ± 12.6	5.1 ± 11.4	4.7 ± 8.3	5.8 ± 7.9
Death (No., %)	696 (5.81)	604 (6.03)	1,410 (2.77)	12 (3.99)	229 (6.10)

P-values (Chi-square test) for hospital type, gender, marital status, and death were all < .001.
P-values for LOS and age (ANOVA test) were < .001.

Table 2 shows the logistic regression analysis results. The results showed that mortality risks of pneumonia patients with different levels of health insurance coverage were different. As expected, older subjects were significantly more likely to have a higher mortality risk than younger subjects (OR = 1.03, p < .001). Results indicated that subjects who had marital status of "married" were more likely to have a higher mortality risk than subjects who were single (OR = 1.18, p = .001). Compared to subjects admitted to a district hospital, subjects who were admitted to a general (OR = 4.17, p < .001) or regional hospital (OR = 8.20, p < .001) had significantly higher mortality risks. The interaction of variable in terms of gender and marital status, gender and age, and age and hospital type were significant and indicated that

Table 2. Multiple variable logistic model of mortality (N = 73,560).

Variable	OR (95% CI)	P
Gender	1.128 (.946 – 1.345)	.181
Age	1.032 (1.030 – 1.034)	.000
Marital status	1.184 (1.072 – 1.309)	.001
LOS	1.010 (1.008 – 1.012)	.000
Hospital type		
General		
Regional	4.169 (3.179 – 5.469)	.000
	8.310 (6.371 – 10.840)	.000
Interaction terms		
Gender*Marital	1.285 (1.059 – 1.559)	.011
Gender*Age	1.003 (1.003 – 1.006)	.034
Age*Hospital type		
Age*Hospital type (1)	1.010 (1.006 – 1.015)	.000
Age*Hospital type (2)	1.005 (1.000 – 1.010)	.035
Health insurance coverage level		
1 (Fully pay)	.729 (.616 - .864)	.000
2 (Insured)	.509 (.430 - .604)	.000
3 (MOPH policy)	.464 (.397 - .544)	.000
4 (Partially pay)	1.055 (.521 – 2.136)	.881

Note : Female, district hospital, marital status defined as single, and LIS patients (Level 5) were set as comparison groups.

the effects were not distributed equally. Furthermore, the results showed that, after controlling for gender, age, LOS, and type of hospital, the patients under the LIS were significantly more likely to have a higher mortality risk than those subjects in other levels, except for those subjects in level 4 (partially pay). Compared to subjects categorized in level 1 (fully pay), 2 (insured), and 3 (MOPH policy), the LIS subjects had a higher mortality risk, ranging from 37% to 120%. Interestingly, patients who could partially pay for their health service costs (MOPH policy patients) did not show any significant difference in mortality risk compared to patients in the LIS group.

DISCUSSION

The objective of this study was to determine the unique effect that the level of health insurance coverage had on mortality risk in pneumonia patients in Thailand. The results suggested that there is a definite relationship between mortality risk in pneumonia patients and their levels of health insurance coverage. The results showed that, among patients with any type of pneumonia who entered the MOPH health care system, lower levels of health insurance coverage had important implications for a higher mortality risk even after controlling for age, gender, LOS, and type of hospital. The findings was consistent with other studies[4,7] which have suggested that patients of lower socioeconomic status have limitations in access to health care services (due to lack of health insurance) and, therefore, have worse outcomes.

We believe that the actual mortality risk for patients who were poor, i.e. level 4 (partially pay) and LIS patients, was higher than the findings since these patients usually prefer to die at home rather

than die in-hospital due to cultural beliefs and the high cost of transportation of a dead body. The findings suggested that providing basic health insurance coverage, even though clearly necessary, may not be sufficient to ensure that access and quality of care are adequate to achieve the desired outcomes. However, up to this time, it is unclear whether the mortality risk differences were due to unmeasured differences in quality of care, restricted or delayed access to care, differences in co-morbidities, or other factors not accounted for in this analysis model. Further study of the influences of these factors is needed.

Results from this study clearly showed that patients under different levels of health insurance coverage, due to the Thai government policies, had different mortality risks. Patients in the LIS plan had significantly higher mortality risk than patients who were under the civil servant medical plan and those patients under other MOPH policies. This finding indicated that there was still inequity in health care services among patients with different levels of health insurance coverage.

We recognize the need for caution in interpreting our findings because of the inherent limitations of the study of this type. First, since the data were derived from a DRG database created from data from all MOPH hospitals in Thailand, incompleteness in recording patients' status or in miscoding of diagnosis might have occurred. Secondly, we lacked individual data of patients transferred to other acute care facilities, such as those transferred from a district hospital to a general hospital. Therefore, some patients might be included in the analyses more than one time if they were transferred to a higher level hospital. Thirdly, we did not have data on treatment and procedural used. Fourthly, we did not control for severity of illness, treatment received, and comorbidity due to lack of information. Finally, to generate a sufficiently large patient sample, we relied on an administrative database. Such databases have been criticized when used for research because of reliability concerns, especially with regard to inconsistent coding between institutes, case-mix adjustment, severity, and adequacy of follow-up.[10,11] However, the findings in this study were consistent with those of a previous study using administrative data.[12] In addition, in 1999, the DRG system did not affect monetary reimbursement for the MOPH hospitals since the Thai government paid all hospitals by "capitation method". Therefore, we believe that the coding of diagnosis would not be subjected to much systemic error and therefore would not affect the results.

In conclusion, the results indicated that the difference in level of health insurance coverage was associated with different mortality risk in pneumonia patients. To our knowledge, our study represents the first such study to investigate the influence of level of health insurance coverage on mortality risk in a Thai population cohort of pneumonia patients.

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