

## Comparison Between Hospital Inpatient Cost and INA-CBGs Tariff of Inpatient Care in the National Health Insurance Scheme in Solo, Boyolali and Karanganyar Districts, Central Java

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### ABSTRACT

**Background:** Hospital has an important referral system role in the implementation on the National Health Insurance (NHI) Scheme. BPJS Kesehatan (NHI Implementing Agency) pays hospitals by Indonesian Case Based Groups (INA-CBGs) method. This payment method may potentially cause loss or profit to the hospital, when there is discrepancy between hospital inpatient cost and INA-CBGs tariff of inpatient care. This study aimed at investigating the discrepancy between hospital inpatient cost and INA-CBGs tariff of inpatient care and the determinants of hospital inpatient cost.

**Subjects and Method:** This was an analytic and observational study cross sectional approach. This study was conducted in 2 public hospitals and 2 private hospitals, from October to December 2016. A total sample of 100 inpatients was selected at random for this study. The dependent variables were hospital inpatient cost and INA-CBGs tariff. The independent variables included hospital type, inpatients class, disease severity, use of ICU, and length of stay. The data were analyzed by a multiple linear regression model.

**Results:** Average hospital inpatient cost (mean= Rp. 2,280,000; SD=1,690,000) was lower than average INA-CBGs (mean=Rp. 3,060,000). There were negative relationships between hospital type, inpatient class, disease severity, and hospital inpatient cost. Private hospital inpatient cost ( $b=-5.66$ ; 95% CI= -1.20 to 0.06;  $p= 0.078$ ) was lower than public hospital inpatient cost. Class 2 inpatient care ( $b= -0.34$ ; 95% CI=-1.09 to 0.41,  $p= 0.371$ ), class 3 inpatient care ( $b =-0.50$ ; 95% CI= -1.23 to 0.23,  $p=0.177$ ), had lower hospital inpatient cost than class 1 inpatient care. Severe disease ( $b= -0.12$ ; 95% CI= -1.95 to 1.71;  $p= 0.894$ ) had lower hospital inpatient cost than mild disease, although it was not statistically significant. There were positive relationships between use of ICU, disease severity, length of stay, and hospital inpatient cost. Using ICU ( $b= 1.58$ ; 95% CI= 0.76 to 2.4;  $p= <0.001$ ) had higher hospital inpatient cost than not using ICU. Moderate disease severity ( $b= 0.55$ ; 95% CI = -0.20 to 1.30;  $p= 0.150$ ) had higher hospital inpatient cost than mild disease. Longer stay ( $b= 0.27$ ; 95% CI= 0.08 to 0.45;  $p= 0.005$ ) had higher hospital inpatient cost than shorter stay.

**Conclusion:** Average hospital inpatient cost was lower than average INA-CBGs tariff. Hospital type, use of ICU, and length of stay, are important determinants of hospital inpatient cost.

**Keywords:** hospital inpatient cost, INA-CBGs tariff, determinant

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### BACKGROUND

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According to WHO (2010), the average people spends 5 to 10% of their income to healthcare finance, while the poorest people can spend a third of their income. WHO

also indicated that 100 million people could become poor due to financing their medical service and 150 million people faced difficulties in paying for medical service. This health expenditure is catastrophic health

spending because it exceeds the capacity to pay for households (Thabrany, 2014). In developed country such as Germany with an average Gross Domestic Product (GDP) of 32.680 US dollars, 10% of healthcare finance uses out of pocket. Meanwhile, Indonesia allocates around 2.5% of GDP for health, 70% uses out of pocket (Coordinating Ministry for People's Welfare RI, 2012). Indonesia is still in the bottom rank in health expenditure compared to other countries such as India, Thailand, Vietnam, Brazil, Korea and others (Li and Hilsenrath, 2016).

To overcome this problem, the 58th World Health Assembly (WHA) in Geneva, 2005, encouraged every country to develop Universal Health Coverage (UHC) for all its population. Therefore, the Indonesian government implemented it through National Health Insurance (NHI) program. The NHI program began with the enactment of Law Number 40 of 2004 concerning the Law on National Social Insurance System and Law Number 24 of 2011 concerning the Law on NHI Implementing Agency (BPJS Kesehatan) (Thabrany, 2014).

Health insurance in the Law on National Social Insurance System and the Law on NHI Implementing Agency have the principle of mutual cooperation which is a great character of Indonesian nation, where in the western concept it is referred to as social responsibility or share responsibility (Thabrany, 2014). In NHI, one of the affordability of access to health care is tiered health care, community health center, or doctor's practice as primary health care facility, and hospital as advanced health care facility; secondary or tertiary depending on the hospital type (Ambarriani, 2014). Hospital as an advanced referral health care facility is one of the important components for providers and health care providers in implementing NHI

program. NHI program is part of public policy as a result of the Government's good will. The success of the Government program in NHI depends on the extent to which this policy is implemented in hospital (Thabrany, 2014). For an example, since 1990, Iran has succeeded in achieving universal health care coverage in primary care facilities, but this country still has problems with advanced health care facilities (Bazyar and Rashidian, 2016).

In accordance with Ministry of Health Regulation Number 69 of 2013 concerning Health Care Tariff Standards at First Level Health Facilities and Advanced Level Health Facilities, for health care provided to participants by advanced referral health facilities, NHI Implementing Agency pays hospitals by Indonesian Case Based Groups (INA-CBGs) method. INA-CBGs tariff is an amount of claim payments by NHI Implementing Agency to advanced level health care facilities for service packages based on classification of diseases. The classification of diseases is important according to Cooper and Craig (2015) which shows that there are variations in health financing even with the same diagnosis.

However, the use of the INA-CBGs system has not been effective. It was obtained from the result of the study which showed a tendency for INA-CBGs tariff was greater than Fee For Service, especially for Non-Surgical cases. Otherwise, for Surgical cases, the tendency for INA-CBGs tariff was lower than Fee For Service (Putra et al., 2014). In addition, Puspendari et al., (2015) stated that the factors associated with healthcare finance were drug cost, length of stay, use of Intensive Care Unit (ICU), and location of the hospital. A study conducted by Ambarriani (2014) shows that inpatient class and disease severity are also related to healthcare finance. The cost of catastrophic disease reaches 32% of the total of health-

care costs. A study conducted by Yuniarti et al. (2015) shows that there is fare difference of therapy for diabetes mellitus in NHI patients between hospital inpatient cost and INA-CBG tariff that potentially cause loss to the hospital.

Based on the explanation above, healthcare finance is an important problem. The controversy from the various studies still exists. Therefore, the researchers were interested in conducting research on hospital inpatient cost which is higher than INA-CBGs tariff and the relationship between hospital inpatient cost and hospital type, inpatient class, disease severity, use of ICU, and length of stay.

## SUBJECTS AND METHOD

This study was a quantitative study. This study used an analytic observational study using cross-sectional design. This study was

**Table 1. The characteristic of the subjects of the study based on gender and age**

Characteristic	n	%
<b>Gender</b>		
Male	40	40.00
Female	60	60.00
<b>Age</b>		
0-20 years	11	11.00
21-35 years	25	25.00
35-88 years	64	64.00

## 2. Univariate Analysis

The description of the variables in univariate analysis explained the general description of each variable. The results of the descriptions of the variables can be seen in Table 2.

**Table 2. The description of the variables of the study**

Variable	n	Mean	SD	Minimum	Maximum
INA-CBGs tariff (XRp.1.000.000)	100	3.06	1.46	1.20	7.35
Hospital inpatient cost (x Rp 1,000,000)	100	2.28	1.69	0.47	10.87
Length of stay (day)	100	4.08	1.72	1	14
Fare difference (XRp.1.000.000)	100	0.78	1.58	-0.63	4.80

conducted in 2 public hospitals and 2 private hospitals, from October to December 2016. A total number of subjects of the study were 100 subjects. This study used consecutive sampling for taking subjects of the study. This study used observation on the patients medical record which have been verified by NHI Implementing Agency as a technique in collecting the data. The data were analyzed by a multiple linear regression model.

## RESULTS

### 1. Sample Characteristics

The results of the study on the frequency distribution of the characteristics of the subjects of the study showed that the number of women was higher than men. Most of the subjects of the study aged 35-88 years. The result could be seen in Table 1.

Table 2 shows that the mean of INA-CBGs tariff was higher than the mean of hospital inpatient cost. The fare difference between INA-CBGs and hospitals was IDR 780,000. The mean of length of stay was 4.08 days with length of stay from 1-14 days.

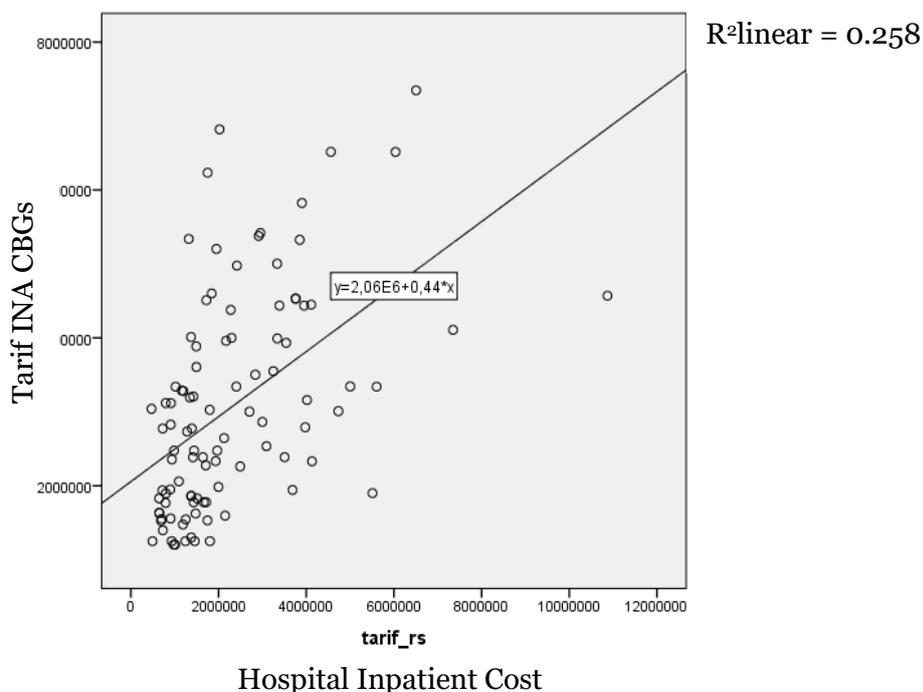
In addition, there was also a description of the variables of inpatient class, disease severity, and use of ICU in Table 3.

Table 3 shows the result of the data from 100 samples as follows: the highest number of inpatient class were class 3 by 39 people (39%), class 2 by 31 people (31%),

and class 1 by 30 people (30%). The highest number of disease severity was mild level (77%), followed by moderate level (20%) and severe level (3%). Those who used ICU were 17% and those who did not use ICU were 83 patients (83%). Data from each four hospitals were 25 samples or 25%.

**Table 3. The description of the variables of the study**

Variable	n	%
<b>Inpatient class</b>		
Class 1	30	30.00
Class 2	31	31.00
Class 3	39	39.00
<b>Disease Severity</b>		
Mild	77	77.00
Moderate	20	20.00
Severe	3	3.00
<b>Use of ICU</b>		
No	83	83.00
Yes	17	17.00
<b>Hospital type</b>		
Private hospital type A	25	25.00
Public hospital type A	25	25.00
Public hospital type B	25	25.00
Private hospital type B	25	25.00



**Figure 1. The relationship between hospital inpatient cost and INA-CBGs tariff**

### 3. Bivariate analysis

Bivariate analysis explained the relationship of one variable with other variables. Variables showed in this bivariate analysis were INA-CBG tariff and hospital inpatient cost.

Figure 1 shows that there was a positive linear relationship between hospital inpatient cost and INA-CBGs tariff with R2 linear value=0.258. It showed an imperfect linear relationship because not all variations in INA-CBG tariff could be explained by variations in hospital inpatient cost.

### 4. Multivariate Analysis

**Table 6. Multivariate analysis of hospital inpatient cost, inpatient class, hospital type, use of ICU, length of stay, and disease severity**

Hospital Inpatient Cost (x Rp. 1.000.000)	b	95% CI		p
		Lower Limit	Upper Limit	
Type of class				
-Class 2	-0.34	-1.09	0.41	0.371
-Class 3	-0.50	-1.23	0.23	0.177
Hospital type				
- Public hospital type A	1.54	0.70	2.37	<0.001
- Public hospital type B	0.31	-0.55	1.18	0.477
- Private hospital typeB	0.85	0.05	1.70	0.049
Type of medical treatment				
-ICU	1.58	0.76	2.4	<0.001
Length of stay (day)	0.27	0.08	0.45	0.005
Disease severity				
-moderate	0.55	-0.20	1.30	0.150
-severe	-0.12	-1.95	1.71	0.894

Multivariate analysis explained more than one independent variables. Table 6 shows that INA-CBG tariff in four hospitals had positive relationship which statistically significant, specifically by use of ICU factor with b value by 1.58 x IDR 1.000.000 CI= 95% and p value = 0.001. In addition, there was positive relationship which statistically significant on length of stay factor with b value=0.27 x IDR .1,000,000; CI= 95% and p value= 0.005.

Besides, hospital inpatient cost between public and private hospital were different. It was shown in Table 7.

**Table 7. Multivariate Analysis of hospital inpatient cost, inpatient class, private hospital, use of ICU, length of stay, and disease severity**

Hospital Inpatient Cost (x Rp 1,000,000)	b	95% CI		p
		Lower Limit	Upper Limit	
Type of class				
-Class 2	-2.48	-1.03	0.54	0.532
-Class 3	-3.91	-1.15	0.37	0.311
Hospital type				
-Private hospital	-5.66	-1.20	0.06	0.078
Type of medical treatment (ICU)	1.29	0.45	0.21	0.003
Length of stay(day)	0.23	0.04	0.42	0.017
Disease severity:				
-moderate	0.49	-0.30	0.13	0.219
-severe	-0.69	-2.55	1.17	0.463

Table 7 shows that the relationship between hospital inpatient cost and use of ICU was positive and statistically significant ( $b = 1.29 \times \text{IDR } 1,000,000$ ; 95% CI;  $p = 0.003$ ). The relationship between hospital inpatient cost and length of stay was also positive and statistically significant ( $b = 0.23 \times \text{IDR } 1,000,000$ , 95% CI;  $p = 0.017$ ). Meanwhile, based on the hospital type, the relationship between hospital inpatient cost and type of hospital was negative and statistically close to significant ( $b = -5.66 \times \text{IDR } 1,000,000$ ; 95% CI;  $p = 0.078$ ).

In addition, multivariate analysis was also carried out on the fare difference and variables: hospital type, inpatient class, use of ICU, length of stay and disease severity.

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## DISCUSSION

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The discussion of the results of the study that have been carried out by the researchers was in accordance with the results of the study on the existing conceptual framework, by connecting the theory and findings of previous studies.

### 1. Hospital inpatient cost compared to INA-CBGs tariff

Based on the results of the study, INA-CBGs tariff was higher than hospital inpatient cost. The relationship is positive and statistically significant, but not too strong.

The results of this study is in line with a study conducted by Sari (2014) that there is a difference between hospital inpatient cost and INA-CBGs tariff in patients with diabetes mellitus. In addition, INA-CBGs tariff is higher than the hospital inpatient cost. On the contrary, other studies conducted by Wang et al (2015) show that the tariff paid by insurance company on the certain cases of illness was lower compared to hospital inpatient cost. It is supported by a study conducted by Yuniarti et al. (2015)

that INA-CBGs tariff was lower than hospital inpatient cost.

Hospital inpatient cost is an aspect which is always monitored by private and public hospitals. Public hospital tariff is set by regional regulations, while private hospital tariff is set by regulations of ministry of health (Trisnantoro, 2004). Every hospital will set tariff according to their missions. Hospital inpatient cost calculation is generally set based on retrospective cost calculation. The costs are charged after carrying out the service. Therefore, it does not push the team of health service providers to do the efficiency (Thabrany, 1998). Meanwhile, INA-CBG tariff is arranged based on prospective method, so that in the future, according to the researchers, hospital inpatient cost calculations are no longer based on retrospective cost calculation. Furthermore, determining standard procedures for dealing with diseases with clinical pathways is important, so that in the NHI era, the hospital team can give medical services optimally, efficiently and effectively. According to Trisnantoro (2004), hospital services not only serve medically, but also lead to commodity goods which refer to market forces in community-based economics. As an organization, hospital changes from normative organization (social) to utilitarian organization (economic), so that hospital becomes an organization which has medical, social, and economical function. As a result, the higher INA-CBGs tariff claim than the hospital inpatient cost will give profit to the hospital.

### 2. Profit and loss related to INA-CBGs tariff claim

Based on the result of the analysis, INA-CBGs tariff was higher than hospital inpatient cost, so that the hospital got profit. Otherwise, if INA-CBGs tariff was lower than hospital inpatient cost, the hospital

would get loss. A previous study showed that INA-CBGs tariff was lower than hospital inpatient cost on the patients with diabetes mellitus (Yuniarti et al., 2015).

According to Cleverly (2002), tariff control is essential for health care providers to maintain financial sustainability in economic competition. Besides, increasing the quality of health services must also be considered by health service providers and policy makers (Anderson et al., 2000). If claims are too low, the treatment cost which has been incurred cannot be paid. Therefore, the health care providers will try to decrease spending by decreasing quality. If claims are too high, health care providers do not have effort to make efficiency and it will waste existing resources (Quentin et al., 2012). It has been shown in various studies that tariff and quality of health services are two things which are interconnected (Younis et al., 2005), although policy makers often assume that tariff and quality of health services are two separate things (Jiang et al, 2006). As a result, problems related to tariff and quality of health services occur. However, it is difficult to achieve goals simultaneously; adequate tariff with optimal quality of health services (Chang and Lan, 2010). The quality of good health services can increase hospital profits by 7.90% through prospective payment method (Hsia and Ahern, 1992). Efficiency is the best balancer between tariff and quality of health service (Schwartz et al., 2002). Determinants which show hospital efficiency are competition, Bed Occupancy Ratio, number of doctors, number of nurses, use of technology, family structure, length of stay, and health policy (Chang and Lan, 2010).

3. The relationship between hospital type, inpatient class, use of ICU, disease severity, and length of stay factors and hospital inpatient cost

#### a. Hospital type

The result of multivariate analysis showed that private hospital tariff is lower than public hospital tariff. This is in line with a study conducted by Mathauer and Wittenbecher (2013) regarding hospital payments with prospective method in various poor and developing countries, private hospital tariff is lower than the claim of DRGs. The efficiency that is expected could be carried out better in private hospitals than in public hospitals.

The lower private hospitals tariff than public hospitals tariff occur due to the differences in the basis of decision making in tariff arrangements. Private hospital is corporate. It determines tariff as efficiently as possible in order to compete in the competition. Meanwhile, public hospital tariff is adjusted to the regional regulations. In addition, it is important to know the mechanism of supply and demand. Theoretically, the smaller tariff is expected to increase demand. The law of demand states that when the price of a product increases - *ceteris paribus* - the demand for the same product will fall (Trisnantoro, 2004).

The lower private hospital tariff than public hospital tariff are affected by other factors, such as efficiency. The efficiency of internal hospitals is often higher in private hospitals compared to public hospitals (Thabrany, 1998). Private hospital can be more efficient because they work together in networks, so that they can support each other in various management aspects such as accounting, purchasing goods, purchasing drugs, laboratory and human resources. This hospital network can increase efficiency because it will create economies of scale (Trisnantoro, 2004)

According to a study conducted by Van den Heever (2012), private health providers have an important role in improving public health. In addition, the private sector

is more productive than the public sector. Efficiency, both allocatively and technically, are very important in increasing production. Technical efficiency gives quantity of output with minimum costs. Besides, allocative efficiency prioritizes value rather than quantity (Clewer and Perkins, 1998). Private hospitals tariff are low because they may have purposes such as reducing competition, maximizing income, minimizing use, and creating corporate image (Trisnantoro, 2004). However, the set of low private hospital tariff may occur due to tariff setting which only looks at competitor prices then splitting the difference (Thabrany, 1998). Based on a study conducted by Tamtomo (1995) conducted in private hospital, it had low tariff. However, after calculating based on unit cost and an analysis of the fee charged, the private hospital tariff was still far from revenue (costs that should have been received). Meanwhile, the "non-profit" public hospitals have actually been efficient - social efficiency, even this hospital type tends to have overproduce (Folland et al., 2001).

#### b. Inpatient class

The result of the analysis showed that there was a relationship between hospital inpatient cost and the inpatient class which statistically non-significant. In a study conducted by Putra et al. (2014), the average patients chose class 3. Based on the various hospitals in Indonesia, inpatient room class 3 is more than other inpatient classes. Another study also showed that hospital inpatient cost class 1 increased hospital inpatient cost more than class 2 and 3 (Yuniarti et al., 2015).

In hospital management, it is expected that there will be a policy in order to have a strong public economy and help decreasing healthcare finance for community with poor economic status. This concept of cross subsidization is expected to

increase the tariff of medical ward class 1 or above and also survive (Trisnantoro, 2004). The calculation of inpatient class tariff depends on the volume of services that can be sold, total fixed costs, variable cost per unit, and desired income (Thabrany, 1998)

#### c. Use of ICU

Based on the result of the analysis, the use of ICU was a factor associated with the increase of hospital inpatient cost and statistically significant. This is in line with a study conducted by Ornek et al (2012) in Turkey that the use of ICU is the largest position in contributing the high overall tariff in inpatients. Other studies also show that the use of ICU increases drug costs in inpatients (Puspandari et al., 2015).

The hospital industry is growing rapidly. The increase of competition requires hospitals to improve various fields, especially tariff and quality of health services (Folland et al., 2001). The improvement of health facilities such as ICU, the use of hemodialysis, and operating room facilities increase hospital inpatient cost because they are related to incentives for human resources and investment in advanced equipment.

#### d. Disease severity

The result of the analysis of disease severity showed non-significant result. This result is in line with a study conducted by Yuniarti et al. (2015), which examined the cost of therapy for diabetes mellitus with the disease severity of 1,2 and 3 do not provide significant result. Otherwise, according to Ornek et al. (2012), the disease severity increased the patient care cost.

The disease severity and complications of a disease have an effect on the provision of more health services. Providing health services includes drugs and/or rehabilitative and supportive services.

e. Length of stay

The result of the analysis between length of stay and hospital inpatient cost showed a strong positive relationship and statistically significant. Based on a study conducted by Pusparani et al., (2015), length of stay provides significant result in increasing hospital inpatient cost.

Length of stay is one aspect of the assessment of an efficient or inefficient hospital. Some diseases that require longer days of treatment are diabetes mellitus, cancer, pulmonary disease, heart disease, stroke, and mental disorder (Cook et al., 2009).

The length of stay has implications on the increase of hospital inpatient cost due to more health services provided, it can even be futile. It also leads to inefficient allocative and resource use. Connecting the efficiency and financing can encourage hospitals to increase efficiency. Furthermore, hospitals must increase the efficiency and effectiveness of tariff to increase the allocation of health services and decrease the length of stay. In relation to the Bed Occupancy Ratio, lots of evidence shows that the increasing number of hospitals actually decreased the occupancy rates. Therefore, many empty beds in hospitals lead to inefficient resources (Chang and Lan, 2010).

Hospital inpatient cost is higher than INA-CBGs tariff. Factors that are positively related to hospital inpatient cost and statistically significant is the use of ICU and the length of stay.

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