Journal of Medical and Health Studies
ISSN: 2710-1452
DOI: 10.32996/jmhs
Journal Homepage: www.al-kindipublisher.com/index.php/jmhs

JMHS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Analysis of Actual Costs and Compliance with the INA-CBGS Tariff for Inpatient Nasopharyngeal Cancer Patients at Dr. Moewardi Regional General Hospital, Surakarta In 2018

Violita Munawaroh[1] ✉ Rina Herowati[2] and Tri Murti Andayani[3]
[12]Fakultas Farmasi, Universitas Setia Budi Surakarta
[3]Fakultas Farmasi, Universitas Gadjah Mada
Corresponding Author: Violita Munawaroh, **E-mail**: hiviolita@gmail.com

| ABSTRACT
Nasopharyngeal cancer is a type of head and neck cancer. According to Globocan data in 2018, it is estimated that there were approximately 17,992 new cases and 11,204 deaths related to this type of cancer. The high incidence and mortality rates, as well as the high actual treatment costs, are the main factors behind the establishment of the National Health Insurance program through the Indonesian Case Base Groups (INA-CBGs) package. However, the INA-CBGs tariff may not always align with the actual costs, leading to cost discrepancies. The objective of this study was to determine the compatibility of actual costs with the INA-CBGs tariff and the factors associated with the actual costs for nasopharyngeal cancer patients at Dr. Moewardi Regional General Hospital in Surakarta. This research utilized an observational study design with a cross-sectional approach from the hospital's perspective. Retrospective data were collected from medical records and patient claims files of the National Health Insurance (BPJS) for nasopharyngeal cancer patients in 2018. Data analysis was conducted using the one-sample t-test to compare the average actual costs with the INA-CBGs tariff. Correlation analysis was performed to identify factors associated with the actual costs. The novelty of this study compared to previous research lies in the object of study, sample size, research period, data, and different conditions from previous studies. The results of the study revealed that there were 54 patients undergoing chemotherapy with a total of 162 treatment episodes and 20 patients undergoing surgery with 21 treatment episodes. For chemotherapy under code C-4-13-I, a total negative difference of -Rp102,565,776 was found across 146 treatment episodes. In contrast, for chemotherapy under code C-4-13-II, a total positive difference of Rp26,972,439 was observed in 16 treatment episodes. As for surgery under code U-4-10-I, a total negative difference of -Rp7,420,989 was found across 4 treatment episodes, and for surgery under code U-4-10-II, a total positive difference of Rp177,572,067 was observed in 17 treatment episodes. Factors associated with the actual costs for chemotherapy were the length of stay (LOS), while for surgery, the factors included LOS, secondary diagnosis, procedure, and severity level, with a p-value < 0.05.

| KEYWORDS

Masopharyngeal cancer; INA-CBGs tariff; chemotherapy; surgery

| ARTICLE INFORMATION

ACCEPTED: 18 July 2023 **PUBLISHED:** 24 July 2023 **DOI:** 10.32996/jmhs.2023.4.4.7

1. Introduction

Nasopharyngeal cancer (NPC) is a type of head and neck cancer that occurs in the nasopharynx region, which is located above the throat and behind the nose [Komite Nasional Penanggulangan Kanker. 2017]. Based on Globocan data (2018), nasopharyngeal cancer is ranked 5th among malignancies in Indonesia and the 6th leading cause of cancer-related deaths. It is estimated that in 2018, there were approximately 17,992 new cases and 11,204 deaths [Globocan. 2018]. A preliminary survey conducted at Dr.

Moewardi Regional General Hospital stated that the total number of inpatient cases of nasopharyngeal cancer in 2016-2017 was 1,527, and in 2018, it was 458 [Bidang et al. 2019].

The main symptoms of nasopharyngeal carcinoma occur in the neck, nose, and ears, usually related to the location of the tumor, its spread, and the stage of cancer. Early symptoms are often unrecognized, resulting in most patients presenting at an advanced stage [Komite Nasional Penanggulangan Kanker. 2017]. Several studies have shown that the incidence of advanced-stage nasopharyngeal cancer is higher compared to early-stage cases. Data from Sanglah General Hospital in Denpasar from 2014 to 2016 revealed that the majority of nasopharyngeal cancer patients were diagnosed at advanced stages, with Stage IVA accounting for 40.35% and Stage III accounting for 17.54% [Saraswati et al. 2019]. The management of nasopharyngeal cancer depends on the stage, complications, and the patient's health status. Treatment options may include radiation therapy, chemotherapy, a combination of both (chemoradiation), and surgery [Komite Nasional Penanggulangan Kanker. 2017].

Nasopharyngeal cancer mainly affects individuals in their productive years, and economically, it can impact the financial situation of the patients and their families, as well as the healthcare financing system of the country [Komite Nasional Penanggulangan Kanker. 2017]. Economic factors play a crucial role in determining the optimal therapy for patients, considering both the side effects and the minimal costs. The implementation of the National Health Insurance (JKN) in Indonesia aims to assist the population by providing healthcare coverage to those who pay premiums, with exceptions determined by the government. The JKN program is administered by the Social Security Organizing Agency (BPJS) [Departemen Kementerian Kesehatan RI, 2014]. Healthcare payments are made using the Indonesian Case Base Groups (INA-CBGs) system, where hospitals and payers no longer itemize bills based on specific services provided but only submit the patient's final diagnosis and procedures [Peraturan et al. 2016].

However, the implementation of the National Health Insurance in Indonesia using the INA-CBGs payment system still results in differences or discrepancies between the actual costs incurred by the hospitals and the INA-CBGs tariff. This is supported by a study conducted by [Dewi BA. 2018], which found a positive difference of Rp8,015,104 between the total actual costs of inpatient breast cancer chemotherapy and the INA-CBGs tariff at Dr. Moewardi Regional General Hospital. Another study by Primananda [8] at Dr. Moewardi Regional General Hospital in Surakarta also reported differences between the actual costs and the INA-CBGs package tariff for lung cancer chemotherapy patients. The highest negative difference was found in severity level I in ward class 3, amounting to -Rp49,394,018. This negative difference was due to the costs of supportive therapy for managing chemotherapy side effects, leading to increased treatment costs. Patients at this severity level required multiple treatment procedures and had more than one secondary diagnosis.

The direct medical costs of nasopharyngeal cancer treatment include medical procedure costs, medication and medical supplies costs, medical support costs, and accommodation costs (inpatient expenses). Factors generally associated with high actual costs in nasopharyngeal cancer therapy include length of stay (LOS), secondary diagnosis, procedures, severity level, chemotherapy cycles, and age. The length of stay (LOS) is related to the actual costs incurred by patients, as inpatient expenses are calculated per day. Therefore, the longer the hospital stay, the higher the costs for accommodation, medication, and medical equipment [8]. The objective of this study is to identify the differences between actual costs and the INA-CBGs package tariff for nasopharyngeal cancer patients at Dr. Moewardi Regional General Hospital in Surakarta and to determine the factors associated with these actual costs.

2. Metodologi Penelitian

This study is observational research with a cross-sectional design from the hospital's perspective. The data collection method was retrospective, where data were obtained from the medical records of inpatient nasopharyngeal cancer patients from January to December 2018, and treatment cost data was obtained from the revenue management department. The research subjects were inpatient nasopharyngeal cancer patients with BPJS (National Health Insurance) coverage at Dr. Moewardi Regional General Hospital in Surakarta who met the inclusion criteria, which included patients with complete medical records and treatment cost data. The exclusion criteria were patients who died or were discharged against medical advice. The data analysis included descriptive analysis, one-sample t-test, and correlation analysis.

The collected data were analyzed using descriptive analysis to determine the distribution of variables and describe the percentage of each variable category during the inpatient stay, including age, gender, nasopharyngeal cancer stage, length of stay (LOS), secondary diagnosis, and procedures. The one-sample t-test was used to test the mean actual costs against the INA-CBG's tariff, assuming that the data followed a normal distribution. This test was used to determine the differences between the actual costs of nasopharyngeal cancer patients and the INA-CBG's tariff. If the p-value was less than 0.05, it could be concluded that there was a significant difference between the two measured variables. However, if the p-value was greater than 0.05, it could be concluded that there was no significant difference between the two measured variables. Multivariate correlation analysis was conducted to determine the relationship between LOS, secondary diagnosis, procedures, severity level, chemotherapy cycles, age, and the actual costs of nasopharyngeal cancer patients.

3. Analisis Dan Pembahasan

The results of the analysis of actual costs and compliance with the INA-CBG's tariff for inpatient nasopharyngeal cancer patients at Dr. Moewardi Regional General Hospital in Surakarta in 2018 included a total of 62 patients who met the inclusion criteria. Among them, 54 patients were classified under chemotherapy with 162 treatment episodes, and 20 patients were classified under surgery with 21 treatment episodes. Two patients received radiotherapy, and based on the data, it was found that these radiotherapy patients were classified under the surgery code, so no INA-CBG's tariff data was available for the radiotherapy code. The distribution of the characteristics of the research subjects based on age (Table 1), gender (Table 2), nasopharyngeal cancer stage (Table 3), length of stay (Table 4), secondary diagnosis (Table 5), and procedures (Table 6) are presented in the tables.

Table 1. Age Distribution of Inpatient Nasopharyngeal Cancer Patients at Dr. Moewardi Regional General Hospital, Surakarta, in 2018

Group (Year)	Number of patients	Percentage**(%)**
35-26	5	8,06
45-36	10	16,13
55-46	20	32,26
65-56	18	29,03
65<	9	14,52
Total patients	62	100

The age grouping in Table 1 is classified according to the Ministry of Health (2009), which includes age ranges of 26-35 years, 36- years, 46-55 years, 56-65 years, and above 65 years]Department indnesia, 4554[. Table 1 shows the highest percentage of 45 nasopharyngeal cancer patients in the age group of 46-55 years (32.26%) and the age group of 56-65 years (29.03%). This is consistent with a study conducted at Dr H. Abdul Moeloek Regional General Hospital, which found that the majority of nasopharyngeal cancer patients were in the age group of 46-55 years (28.6%) [10]. These findings are also in line with the study by Dawolo et al(2017).which reported that the highest number of nasopharyngeal cancer patients was in the age group of 46- , .55 years (30.91%). This could be attributed to risk factors such as smoking habits and consumption of preserved foods Additionally, increasing age leads to a decline in immunity, which increases the risk of comorbidities and complications

Table 2. Distribution of Gender among Inpatient Nasopharyngeal Cancer Patients at Dr Moewardi Regional General Hospital, Surakarta, in 2018

Gender	**Number of patients**	**Percentage(%)**
Male	43	69,35
Female	19	30,65
Number of patients	62	100

.The results of the gender grouping in Table 2 indicate that nasopharyngeal cancer is more common in males compared to females This is consistent with a study conducted by Rosita and Widyaningsih(2017). which found that the majority of nasopharyngeal , cancer patients at Dr Moewardi Regional General Hospital in Surakarta were male (60.6%). Similar findings were reported by Kuswandi et al (2020). stating that nasopharyngeal cancer occurs more frequently in males (65%). The American Cancer Society , also mentions that males are twice as likely to develop nasopharyngeal cancer compared to females, which can be attributed to lifestyle factors such as smoking, working in the chemical industry with a higher likelihood of inhaling chemical fumes, and prolonged exposure to carcinogen(American Cancer Societ (2019).

Table 3. Distribution of Nasopharyngeal Cancer Stages at Dr Moewardi Regional General Hospital, Surakarta

Cancer stage	Amount	(%) Percentage
I	1	0,55
II	10	5,46
III	62	33,88
IVA	66	36,07
IVB	34	18,58
Unknown	10	5,46
Total	183	100

The determination of staging system in nasopharyngeal cancer is crucial in selecting the appropriate treatment. The staging system provides information about the size of the tumor, involvement of lymph nodes, and presence of metastasis in other organs. The ,staging of nasopharyngeal cancer at Dr Moewardi Regional General Hospital in Surakarta in 2018 is classified as follows: Stage I II, III, IVA, and IVB (Table 3)

Table 3 shows that the most common stages of nasopharyngeal cancer at Dr Moewardi Regional General Hospital in Surakarta in were Stage IVA (36.07%) and Stage III (33.88%). This indicates that patient awareness for seeking treatment in the early 2018 symptoms or early stages of the disease is still low, as evidenced by the low percentage (0.55%) in Stage I. These findings are consistent with a study conducted at Sanglah General Hospital in Denpasar, which found that most nasopharyngeal cancer patients were diagnosed at advanced stages, with Stage IVA accounting for 40.35% and Stage III accounting for 17.54% [4]. This is also in line with the theory stating that early diagnosis of nasopharyngeal cancer is challenging due to nonspecific initial signs and symptoms and the difficulty of examining the nasopharynx, leading to patients often being diagnosed at advanced stages(American Cancer Society. 2019)

,Table 4. Distribution of Length of Stay (LOS) for Nasopharyngeal Cancer Patients at Dr Moewardi Regional General Hospital .Surakarta

Severity level	Class treatment	average	) MinDay(	Max (Day)
Chemotherapy				
C-4-13-I	Kelas 1	2,77	2	3
	Kelas 2	3,46	3	6
	Kelas 3	3,27	3	7
C-4-13-II	Kelas 1	4,5	3	6
	Kelas 2	6	6	6
	Kelas 3	4,3	4	6
Neoplasm of ear, nose, mouth and throat (surgery)				
U-4-10-1	Kelas 3	4,25	3	6
U-4-10-II	Kelas 1	2	2	2
	Kelas 2	5	3	8
	Kelas 3	3,1	2	5

The results of the study in Table 4 indicate differences in the average Length of Stay (LOS) among the severity levels and treatment classes. Chemotherapy code C-4-13-II had the highest average LOS compared to C-4-13-I. This is due to the procedures received by nasopharyngeal cancer patients at severity level II. These patients do not immediately undergo chemotherapy but receive prior treatment for anemia, such as blood transfusion, which prolongs the length of stay.

The highest average LOS in code U-4-10 was found in severity level II, ward class 2, lasting for 5 days. The longer LOS is due to the high severity level, the presence of secondary diagnoses, and the number of procedures or treatments received by nasopharyngeal cancer patients, including blood transfusion, chemotherapy, and nasopharyngeal biopsy. Additionally, the side effects of chemotherapy experienced by patients also contribute to the length of stay (LOS), as the treatment provided to manage these side effects prolongs the hospital stay.

Table 5. Distribution of Secondary Diagnoses among Chemotherapy and Surgery Patients with Nasopharyngeal Cancer at Dr Moewardi Regional General Hospital, Surakarta, in 2018.

Secondary diagnosis group	Number of treatment episodes	Percentage (%)
ChemotherapyC-4-13		
D63.0 *(Anemia in neoplastic disease)*	16	94,12
I10 (*Essential primary hypertension*)	1	5,88
Total	17	100
Neoplasm of ear, nose, mouth and throat U-4-10		
D63.0 *(Anemia in neoplastic disease)*	17	85
I10 (*Essential primary hypertension*)	1	5
(*D37.0 *(Adenoid tissue	1	5
***(Perforation of nasal septum, rinolith)* J34.8**	1	5
Total	20	100

Table 5 shows that the secondary diagnosis that is often experienced by patients with nasopharyngeal cancer is anemia. Secondary diagnosis other than anemia is hypertension. This result is in line with research at Prof. Hospital. Dr Margono Soekarjo that the high number of nasopharyngeal cancer patients who experience anemia (13%) is caused by the high use of the cisplatin regimen in nasopharyngeal cancer therapy, besides that other comorbidities are hypertension by 6.7% (Mustajabah et al2012)

The percentage of anemia in cancer patients ranges from 30-90%; the causes of anemia in cancer patients include metabolic and nutritional disorders, chronic disease, kidney disorders, blood loss, decreased production due to bone marrow disease, drug-induced red blood cell aplasia and anemia due to chemotherapy. Chemotherapy agents can cause anemia by interfering with hematopoiesis, platinum-based regimens can cause anemia due to toxic effects on bone marrow and kidneys (Febriani 2019)

Table 6. Distribution of procedures in chemotherapy patients and nasopharyngeal cancer surgery patients at RSUD Dr Moewardi Surakarta in 2018

procedure group	Number of treatment episodes	(%) Percentage
ChemotherapyC-4-13		
***(Transfusion of packed cells)* 99.04**	16	84,21
***(Echocardiography)* 88.72**	3	15,79
Total	19	100
Neoplasm of ear, nose, mouth and throat U-4-10		
***(Transfusion of packed cells)* 99.04**	17	65,38
Injection or infusion of cancer chemotherapeutic)* 99.25 *(substance	3	11,53
***(Radioisotopic teleradiotherapy)* 92.23**	2	7,69
***(Relaxation of scar or web contracture of skin)* 86.84**	1	3,85
***(Lysis of pharyngeal adhesions)* 29.54**	1	3,85
***(Routine chest x- ray)* 87.44**	1	3,85
***(Temporary tracheostomy)* 31.1**	1	3,85
Total	26	100

The results of the study in Table 6 show that out of 162 treatment episodes for nasopharyngeal cancer patients undergoing .chemotherapy, the procedure with the highest percentage other than chemotherapy is blood transfusion (99.04) at 84.21% Similarly, for nasopharyngeal cancer patients undergoing surgery, out of 21 treatment episodes, the majority also received blood transfusion)65.38%(

These findings are consistent with the study by)Primananda 2018(, which found that blood transfusion was the most commonly performed procedure in the treatment of lung cancer patients, accounting for 60%. Blood transfusion is a frequently used procedure in cancer treatment because it involves the transfusion of red blood cells to address red blood cell disorders caused by cancer or chemotherapy drugs. This procedure is relevant to the treatment of nasopharyngeal cancer patients since the most common secondary diagnosis among them is anemia

Analysis of Real Costs Based on INA-CBG's Tariff

The analysis of real costs based on the INA-CBG's tariff aims to determine whether there is conformity between the actual costs and the INA-CBG's costs, which can be observed from the difference in treatment costs. The cost difference is obtained by subtracting the total INA-CBG's tariff from the total actual costs without chemotherapy drugs

Table 7. Difference between INA-CBG's tariff and total actual costs without chemotherapy drugs for nasopharyngeal cancer .patients at Dr. Moewardi Regional General Hospital, Surakarta, in 2018

Severity level	Number of episodes (n=183)	INA-CBG's total fare (IDR)	Total real cost (IDR)	Difference Positive/Negativ) (e (IDR)	suitability INA-CBG's	
					Appropriate	Not suitable
ChemotherapyC-4-13-I						
Class 1	13	55.963.700	50.218.790	5.744.910	10	3
Class 2	48	177.120.000	231.354.765	54.234.765-	27	21
Class 3	85	261.375.000	315.450.921	54.075.921-	23	62
Total	146	494.458.700	597.024.476	102.565.776-	60	86
ChemotherapyC-4-13-II						
Class 1	2	16.203.800	10.860.560	5.343.240	2	-
Class 2	1	6.944.500	5.058.802	1.885.698	1	-
Class 3	13	75.232.300	55.488.799	19.743.501	13	-
Total	16	98.380.600	71.408.161	26.972.439	16	-
Neoplasm of ear, nose, mouth and throat U-4-10-I						
Class 3	4	20.563.200	27.984.189	7.420.989-	-	4
Total	4	20.563.200	27.984.189	7.420.989-	-	4
Neoplasm of ear, nose, mouth and throat U-4-10-II						
Class 1	4	65.906.000	10.179.500	55.726.500	4	-
Class 2	3	42.368.400	13.583.224	28.785.176	3	-
Class 3	10	117.690.000	24.629.609	93.060.391	10	-
Total	17	225.964.400	48.392.333	177.572.067	17	-

Table 7 shows a difference between the INA-CBG's tariff and the total actual costs without chemotherapy drugs. For nasopharyngeal cancer patients undergoing chemotherapy with severity level I (C-4-13-I), there was a total negative difference of Rp102,565,776, with cost conformity observed in 60 treatment episodes and non-conformity in 86 episodes. Similar to the study- by Primananda [8] at Dr Moewardi Regional General Hospital, negative differences were also found between the actual costs and the INA-CBG's tariff for lung cancer patients undergoing chemotherapy. In severity level I, a total negative difference of -Rp50,030,467 was obtained, with cost conformity observed in 17 patients and non-conformity in 11 patients

The negative difference in code C-4-13-I was caused by the high cost of drugs, medical supplies, and medical procedures. The length of stay (LOS) also influenced the total actual costs of the hospital, with the maximum LOS in ward classes 2 and 3 being 7 days. This is because some patients received chemotherapy for 3 days and then underwent procedures to manage chemotherapy side effects, resulting in a longer hospital stay and increased treatment costs

For patients undergoing surgery with code U-4-10-I in ward class 3, a negative difference of -Rp7,420,989 was found, with cost non-conformity in 4 treatment episodes. The negative difference in code U-4-10-I was due to the high medical costs associated ,with the code, which were influenced by the presence of secondary diagnoses and multiple procedures received by the patients such as nasopharyngeal biopsy, temporary tracheostomy, excision of multiple lymphadenopathy GA, and revision of nasal synechiae. These findings are consistent with the study by)Santoso et al2020) which found a total negative difference between , actual costs and the INA-CBG's tariff for breast cancer patients in severity level 1, amounting to -Rp187,228,700

Such situations can have an impact on the hospital's financial situation, necessitating specific strategies to address the differences between actual costs and claims based on the INA-CBG's tariff. One way to address this is through medical audits and utilization reviews, as well as the implementation of clinical pathways and Clinical Practice Guidelines (CPG)

Clinical pathways consist of treatment protocols and standard patient care from admission to discharge. This allows hospitals to optimize effective and efficient healthcare services, specifically for nasopharyngeal cancer patients. The existence of clinical pathways ensures that patient care follows established standards, reducing variations in treatment among physicians

The positive differences in code C-4-13-II in all ward classes amounted to Rp26,972,439, with cost conformity in 16 treatment episodes. For code U-4-10-II, the positive difference was Rp177,572,067, with cost conformity in 17 treatment episodes. This indicates that the therapeutic procedures for nasopharyngeal cancer patients resulted in an excess claim, where the INA-CBG's tariff exceeded the total actual costs of the hospital, thus providing sufficient payment based on the INA-CBG's tariff at Dr Moewardi Regional General Hospital, Surakarta

The positive differences in code C-4-13-II and code U-4-10-II were due to the high severity levels, which resulted in higher INA-CBG's tariffs. This contributed to the fulfillment of the tariff claims. The accuracy of coding diagnoses and procedures also greatly affects the magnitude of actual costs. In code U-4-10-II, patients had a secondary diagnosis of anemia and underwent procedures such as blood transfusion, nasopharyngeal biopsy, chemotherapy, and radiation therapy. Although code U-4-10 represents neoplasms of the ear, nose, mouth, and throat, chemotherapy and radiation therapy are included in the tariff for this code, and there was only one patient who underwent nasopharyngeal biopsy. As a result, the total actual costs were much lower than the INA-CBG's tariff, resulting in the positive difference

Table 8. Comparison between the Average Actual Costs and INA-CBG's Tariff for Nasopharyngeal Cancer Patients at Dr .Moewardi Regional General Hospital, Surakarta, in 2018

Severity level	Class treatment	Average real cost without chemo (Rp)	Rates INA-CBGs (IDR)	Min (IDR)	Max (IDR)	*p*
Kemoterapi						
Chemotherapy	Class 1	3.862.984	4.304.900	2.592.269	5.791.812	0,000
	Class 2	4.819.891	3.690.000	2.639.617	17.555.114	0,009
	Class 3	3.711.187	3.075.000	1.073.822	13.226.762	0,000
C-4-13-II	Class 1	5.430.280	8.101.900	4.314.203	6.546.357	0,005
	Class 2	5.058.802	6.944.500	-	-	-
	Class 3	4.268.369	5.787.100	2.748.827	6.055.383	0,000
Neoplasm of ear, nose, mouth and throat (Surgery)						
U-4-10-I	Class 3	6.996.047	5.140.800	5.630.449	9.984.983	0,000
U-4-10-II	Class 1	2.544.875	16.476.500	1.662.646	4.170.871	0,000
	Class 2	4.527.741	14.122.800	2.938.966	6.765.852	0,008
	Class 3	2.462.961	11.769.000	1.891.002	3.649.405	0,000

The results obtained in Table 8 show that the average actual costs for nasopharyngeal cancer patients with chemotherapy code C-4-13-II are higher than those with chemotherapy code C-4-13-I. The higher average actual costs at severity level II are due to a higher number of secondary diagnoses and procedures compared to severity level I, resulting in higher actual costs

The average actual costs for chemotherapy code C-4-13-I in ward class 1 and C-4-13-II in ward classes 1, 2, and 3 are lower than the INA-CBG's tariff, while for chemotherapy code C-4-13-I in ward classes 2 and 3, the average actual costs are higher than the INA-CBG's tariff. This is because the length of stay (LOS) and the number of treatment episodes are highest in ward classes 2 and resulting in higher therapy costs in those ward classes. The highest therapy costs are related to drug and medical supply costs ,3 as well as medical expenses. Due to these high costs, the minimum and maximum values for severity level I have a wide range of costs. For example, the maximum value in ward class 2 is Rp17,555,114. The minimum value represents the smallest value in the data, while the maximum value represents the largest value in the data

.Table 8 shows that the average actual costs for code U-4-10-1I are lower than the INA-CBG's tariff, and the difference is significant ,This is because patients undergoing code U-4-10-1I have a shorter LOS, with an average of 3 days. The shorter the hospital stay the lower the costs incurred by the patients. Additionally, the accuracy of coding diagnoses and procedures greatly affects the magnitude of the actual costs

According to a study by Susanti [19], the accuracy of coding diagnoses and procedures greatly influences the accuracy of the tariff data in the INA-CBG software, as the accuracy of coding will result in differences between the INA-CBG's tariff and the actual tariff that complies with the standard. Inaccuracies can be minimized through medical audits to ensure the accuracy of the primary .diagnosis determined by the doctors and coding audits to ensure the accuracy of the assigned diagnosis and procedure codes The accuracy of diagnosis determination will impact the accuracy of assigning INA-CBG's tariff groups]20[

The results of the one-sample t-test analysis for patients with chemotherapy code C-4-13-I in ward classes 1, 2, 3, and C-4-13-II in ward classes 1 and 3 yielded a p-value < 0.05, indicating a significant difference in the average actual costs based on the INA-CBG's tariff. However, the analysis could not be performed for patients with chemotherapy code C-4-13-II in ward class 2 as there was only one patient, making it impossible to compare. For patients undergoing surgery with nasopharyngeal cancer code U-4-I/II in all ward classes, the one-sample t-test analysis yielded a p-value < 0.05, indicating a significant difference in the average-10 actual costs based on the INA-CBG's tariff

Factors Related to Actual Costs

Correlation analysis was conducted to determine the relationship between factors such as length of stay (LOS), secondary diagnoses, procedures, severity level, chemotherapy cycles, and age with the total actual costs at Dr Moewardi Regional General Hospital in 2018. Table 9 presents the results of the correlation analysis for patients undergoing chemotherapy and surgery for nasopharyngeal cancer

Table 9. Results of correlation analysis for factors related to actual costs in nasopharyngeal cancer patients at Dr Moewardi .Regional General Hospital in 2018

Factor	**Chemotherapy C-4-13**		**Neoplasm of ear, nose, mouth and throat (Surgery) U-4-10**	
	Real Cost		**Real Cost**	
	r	p	r	p
LOS	0.720	**0.000**	0.674	**0.001**
Secondary diagnosis	0.043	0.587	0.639-	**0.002**
Procedure	0.063	0.426	0.477	**0.029**
Severity level	0.049	0.534	0.769-	**0.000**

Chemotherapy cycle	0.077-	0.328	-	-
Age	0.173-	0.058	0.134	0.562

,Table 9 shows that the analysis for chemotherapy code C-4-13 indicates that the length of stay (LOS) has a p-value < 0.05 indicating a significant relationship with the actual costs. The correlation coefficient r for LOS is 0.720, indicating a strong positive relationship between LOS and actual costs. This means that as the length of patient hospitalization (LOS) increases, the actual costs also increase. This is consistent with the study by(Susanti 2019) which states that the duration of hospitalization is related to the actual costs because the length of stay is calculated per day, so the longer the patient stays, the higher the costs incurred by the patient. There is no significant relationship (p > 0.05) between the factors of secondary diagnoses, procedures, severity level, chemotherapy cycles, and age with the actual costs for chemotherapy code

For surgery code U-4-10 (neoplasms of the ear, nose, mouth, and throat), the analysis shows that age is not related to the actual > costs (p > 0.05). However, the factors of LOS, secondary diagnoses, procedures, and severity level have significant values (p indicating a relationship with the actual costs. This is consistent with the study by Manawan et al. [21] at Prof. Dr Kandou ,(0.05 Hospital in Manado, which states that a longer length of stay (LOS) leads to increased hospital tariffs due to the increased services provided, resulting in higher actual costs. Additionally, higher severity levels are generally associated with higher total actual costs for patients

4. Conclusion

The research findings conclude that there are differences between the actual costs and the INA-CBGs tariffs for nasopharyngeal cancer patients. For chemotherapy, the code C-4-13-I shows a total negative difference of -Rp102,565,776 for 146 treatment episodes, while the code C-4-13-II shows a total positive difference of Rp26,972,439 for 16 treatment episodes. For surgery, the code U-4-10-I in ward class 3 shows a total negative difference of -Rp7,420,989 for 4 treatment episodes, while the code U-4-10-II shows a total positive difference of Rp177,572,067 for 17 treatment episodes. The one-sample t-test analysis yields a p-value < 0.05 for all severity levels, indicating a significant difference in actual costs based on the INA-CBGs tariffs. Factors related to actual costs for chemotherapy are the length of stay (LOS) and for surgery; they include the length of stay (LOS), secondary diagnoses, procedures, and severity level, with p-values < 0.05.

Funding: This research received no external funding.
Conflicts of Interest: The authors declare no conflict of interest.
Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers.
Acknowledgments: We would like to express our gratitude to Dr Moewardi Regional General Hospital in Surakarta for granting permission to use the data of nasopharyngeal cancer patients, the education and research staff, medical record staff, and revenue management staff.

References

[1] American Cancer Society. (2019). Nasopharyngeal cancer causes risk factors and prevention. https://www.cancer.org/cancer/nasopharyngeal-cancer/causes-risks-prevention.html [Diakses 16 November 2019].
[2] American Cancer Society. (2019). Nasopharyngeal cancer early detection diagnosis and staging. https://www.cancer.org/cancer/nasopharyngeal-cancer/detection-diagnosis-staging.html [Diakses 16 November 2019].
[3] Bidang R, Medis RSUD and Moewardi. (2019). Data 20 Besar Penyakit Rawat Inap. RSUD Dr. Moewardi Surakarta.
[4] Departemen Kementerian Kesehatan RI, (2014). Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2014 Tentang Pedoman Pelaksanaan Jaminan Kesehatan Nasional. Jakarta: Kementerian Kesehatan Republik Indonesia.
[5] Dewi BA. (2018), analisis kesesuaian biaya terapi riil dengan tarif ina-cbg's pasien rawat inap kanker payudara dengan kemoterapi di RSUD Dr. Moewardi Surakarta tahun 2017 [Tesis]. Surakarta: Fakultas Farmasi, Universitas Setia Budi.
[6] Departemen Kesehatan RI. (2009). Kategori usia. http://kategori-umurmenurut-Depkes.html [Diakses 5 Juni 2020].
[7] Dawolo, A. P, Utama DS, Kasim BI. (2017). Profil klinis karsinoma nasofaring di departemen THTKL RSUP Dr. Mohammad Hoesin Palembang tahun 2014-2015. Majalah Kedokteran Sriwijaya 49:1-9.
[8] Febriani A, Rahmawati Y. (2019). Efek samping hematologi akibat kemoterapi dan Tatalaksananya. *Jurnal Respirasi 5*:22-28.
[9] Globocan. (2018). Cancer today, International agency for research on cancer. https://gco.iarc.fr/today/home [Diakses 16 November 2019].
[10] Handayani L, Suharmiati and Pratiwi NL. (2018). Unit cost rumah sakit dan tarif ina-cbgs: sudahkah pembiayaan pelayanan kesehatan rumah sakit dibayar dengan layak?. Buletin Penelitian Sistem Kesehatan 21(4):219-227. https://ejournal2.litbang.kemkes.go.id/index.php/hsr/article/download/45/569 [Diakses 01 Agustus 2020].
[11] Kuswandi A, Kuswandi NH, Kasim M, Tanim and Wulandari M. (2020). Karakteristik histopatologi dan stadium klinis kanker nasofaring. Jurnal Ilmiah Kesehatan Sandi Husada 11:243-251.

[12] Komite Nasional Penanggulangan Kanker. (2017). Pedoman Nasional Pelayanan Kedokteran Kanker Nasofaring. Kementerian Kesehatan Republik Indonesia.
[13] Manawan F, Widodo GP and Andayani TM. (2019). Cost of illness pasien kanker payudara di rumah sakit umum pusat Prof Dr. Kandou Manado. *Pharmacy Medical Journal* 2:86-93.
[14] Mustajabah L, Setiawan D, Sudarso. (2012). Pola terapi pada pasien kanker nasofaring di RSUD Prof. Dr. Margono Soekarjo. Pharmacy 9:94-117.Peraturan Menteri Kesehatan Republik Indonesia Nomor 76 Tahun 2016 tentang Pedoma Indonesian Case Base Groups (INA-CBG) dalam Pelaksanaan Jaminan Kesehatan Nasional. Jakarta : Permenkes RI
[15] Peraturan M and Kesehatan RI N 76 Tahun (2016) tentang Pedoma Indonesian Case Base Groups (INA-CBG) dalam Pelaksanaan Jaminan Kesehatan Nasional. Jakarta: Permenkes RI.
[16] Primananda AZ. (2018), analisis kesesuaian biaya riil dengan biaya ina-cbg's pada kemoterapi pasien kanker paru-paru rawat inap peserta jkn di RSUD Dr. Moewardi Surakarta tahun 2017 [Tesis]. Surakarta: Fakultas Farmasi, Universitas Setia Budi.
[17] Rahman S, Budiman BJ, Subroto H. (2015). Faktor risiko non viral pada karsinoma nasofaring. *Jurnal Kesehatan Andalas* 4:988–95.
[18] Rosita I, Widyaningsih S. (2017). Gambaran tingkat pengetahuan tentang radioterapi pada pasien kanker nasofaring di RSUD Dr. Moewardi Surakarta. *Jurnal Jurusan Keperawatan*.
[19] Saraswati IGW, Nuaba IGA and Suanda IK. (2019). Karakteristik pasien karsinoma nasofaring di RSUP Sanglah Denpasar tahun 2014-2016. *Jurnal Medika 8*:56-66.
[20] Santoso A et al. (2020). Perbandingan biaya riil dengan tarif ina-cbg's penyakit kanker payudara pada era jaminan kesehatan nasional. JFSP 6:60-66.
[21] Susanti Y. (2019). analisis perbedaan tarif rumah sakit dan tarif ina-cbg pelayanan rawat inap di RSU Panti Baktiningsih [Skripsi]. Yogyakarta: Fakultas Ekonomi, Universitas Sanata Dharma.