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Analysis of Direct Medical Costs in Hemodialysis Patients

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A B S T R A C T

Hemodialysis is a costly and lifelong treatment. The objective of this study is to ascertain the overall expenses associated with therapy for outpatient chronic kidney failure patients undergoing hemodialysis, from the standpoint of a hospital. Additionally, the study aims to identify any notable disparities between the actual therapy costs and the rates provided by INA-CBG for hemodialysis patients. The present study employs a non-experimental analytical approach, utilising a cross-sectional research methodology. The retrospective collection of data was conducted using the medical records of National Health Insurance (JKN). The hospital perspective indicates that the direct medical costs associated with hemodialysis for 69 outpatient patients with chronic kidney disease (CKD) for the period of October to December amount to IDR 70,129,389.00. A notable disparity exists between the actual expenses and the INA-CBG package rates for chronic kidney disease (CKD) patients receiving hemodialysis at N-3-15-0.

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INTRODUCTION

In recent decades, an increasing body of research has indicated that the adverse consequences associated with chronic kidney disease, such as renal failure, cardiovascular disease, and premature mortality, can be mitigated or postponed. Early detection of chronic kidney disease can be achieved by laboratory testing. Treatment for earlier stages of chronic renal illness can substantially delay the onset of renal failure. Early initiation of treatment for cardiovascular risk factors in chronic renal illness is crucial in order to mitigate the occurrence of cardiovascular disease events, both prior to and following the disease (National Kidney Foundation, 2002).

CKD is a disease that causes patients to have to undergo hemodialysis. Based on the results of basic health research in 2018, CKD sufferers experienced an increase of 1.8% from 2013. The number of residents aged ≥ 15 years who had or were undergoing dialysis who had been diagnosed with chronic kidney disease was 19.3% (Laporan Riskesdas 2018 Nasional).

Chronic kidney disease (CKD) refers to the inability of the kidneys to perform their essential activities due to prolonged damage lasting at least three months. Furthermore, heart disease and stroke are supplementary health conditions that heighten the susceptibility to CKD. A significant proportion of individuals with chronic kidney disease (CKD) remain asymptomatic until the disease progresses to an advanced stage or problems manifest (National Kidney Foundation, 2022).

According to the 2012 report from Kidney Disease: Improving Global Outcomes (KDIGO), the expenses associated with dialysis and transplantation account for a significant share of the healthcare budget. Several nations have implemented public health programmes aimed at early detection and management of chronic kidney disease (CKD) and its associated complications, owing to its significant prevalence, negative consequences, and substantial financial burdens, particularly in cases of end-stage renal failure (KDIGO, 2013).

Cost of illness analysis was the earliest form of economic evaluation in the health care field. The main objective is to evaluate the economic burden that disease imposes on society as a whole in terms of health care resource consumption and production losses. The standard health care tariffs at first level health facilities and advanced level health facilities in the operation of health insurance programmes have been regulated in Minister of Health regulation number 69 of 2013. The Indonesian rate, known as INA-CBG's, refers to the claim payments made by BPJS health to advanced level health institutions for service packages categorised by disease diagnosis groupings (PERMENKES, 2013).

Direct medical costs are any costs related to prevention, detection, or treatment of a disease. Examples of direct costs are: products and pharmaceutical services, doctor services, treatments, laboratory tests, etc (Raymond R Tjandrawinata, 2016).

The objective of this study is to ascertain the overall expenses associated with therapy for individuals with chronic kidney failure who undergo hemodialysis, both as inpatients and outpatients, from the standpoint of

hospitals. Additionally, the study aims to identify any notable disparities between the actual therapy costs and the rates provided by INA-CBG for hemodialysis patients. Given the substantial and far-reaching physical, social, and economic consequences of CKD, it is imperative to prioritise the early identification, prevention, and treatment of CKD in Indonesia.

LITERATURE REVIEW

Chronic Kidney Disease (CKD) refers to the impairment of kidney function for a minimum duration of 3 months. It is characterised by a structural or functional abnormalities in the kidney, which may or may not result in a reduction in the Glomerular Filtration Rate (GFR). Presents as pathological irregularities or renal impairment, characterised by an imbalance in the composition of chemicals in the blood or urine, and potential interference with the imaging examination results (Pernefri, 2013).

Dialysis is one method of kidney replacement therapy due to kidney failure. When the kidneys are disturbed, the filtration, absorption-secretion and excretion functions will be disrupted resulting in a buildup of toxic metabolites in the body which are usually excreted through the kidneys (called uremic toxins). The kidneys can experience acute or chronic dysfunction, which at some stage will require dialysis to help remove uremic toxins (Tjokroprawira et al., 2015).

The INA-CBG payment system is widely regarded as an effective mechanism for managing health expenditures, promoting adherence to health service standards, curbing the provision of superfluous or excessive health services, and incentivizing healthcare providers to exercise cost control measures. However, hospitals in Indonesia usually use a payment system per service (fee for service). Where each patient pays according to the services they receive, health service providers use this system to charge for all services provided. The prices applicable at the hospital will apply to each examination and procedure (Amalia, 2020).

With the era of National Health Insurance (JKN) in Indonesia which is implemented through a social insurance mechanism with principles
cost and quality control, namely their integration quality health services with controlled costs. In implementing JKN a payment pattern has been set to the facility advanced health with Indonesia Case Base Groups (INA-CBGs) (Fauziah et al., 2015).

The price implemented by INA-CBG is a comprehensive package tariff that encompasses all elements of hospital resources utilised in both medical and non-medical services. In advanced referral health facilities, INA-CBG serves as a payment option for services rendered to both outpatients and inpatients (Permenkes, 2016).

BPJS Health utilises the INA-CBG system as a payment model to reimburse hospital claims. This system operates on a package basis, which is determined by the patient's disease diagnosis. The utilisation of the INA-CBG system facilitates the objective calculation of service rates by relying on actual expenses (Leonard et al., 2021).

The INA-CBG rates encompass various categories of health services, namely class A, class B, class C, and class D, within region 1. Additionally, the rates are applicable to health services provided in class A, class B, class C, and class D within region 2. Furthermore, the tariffs are applicable to health services provided in class A, class B, class C, and class D within region 3. Furthermore, the tariffs are applicable to health services provided in class A, class B, class C, and class D within region 4. Lastly, the tariffs are applicable to health services provided in class A, class B, class C, and class D within region 5. Lastly, the tariffs are applicable to health services provided by national referral public hospitals. This inquiry pertains to the rates of health services rendered by national special referral hospitals (PERMENKES, 2013).

The determination of INA-CBG rates relies on the utilisation of cost data and hospital coding. Cost data was collected from a specific sample of hospitals, providing information on the hospital's class, type, and ownership. This sample included both private hospitals and 31 government hospitals. This dataset encompasses all expenses accrued by hospitals, with the exception of pharmaceuticals financed by government initiatives such as HIV and TB. JKN rates were calculated using costing data from 137 government and private hospitals, along with 6 million coding data (cases) (Amalia, 2020).

Based on research conducted by Azalea et al (2016) that there is a difference in costs or rates between real costs and INA-CBG's rates and the factors that influence the size of hospital rates are comorbidities, frequency of HD and LOS.

METHODOLOGY

The present study employs a non-experimental analytical approach, utilising a cross-sectional research methodology. The data was collected retrospectively from the medical records of patients with chronic kidney failure who were covered by National Health Insurance (JKN) and received hemodialysis treatment between October and December. The present study was undertaken from the standpoint of hospitals as suppliers of health services. The sampling methodology employed in this study was sequential sampling, wherein all participants who met the predetermined selection criteria were included until the desired sample size was achieved. The sampling procedure adhered to the predetermined inclusion criteria, which specifically targeted patients receiving hemodialysis therapy and consisted of participants covered by the National Health Insurance (JKN)/BPJS programme. The exclusion criteria pertain to patients who bear the financial burden.

RESEARCH RESULT

Characteristics of outpatients undergoing hemodialysis

Based on the research results, the minimum number of outpatient samples that had been determined with the main diagnosis of N18 was 69 samples from CKD patients undergoing hemodialysis.

Table 1. Characteristics of outpatient chronic kidney disease patients on hemodialysis

Characteristics patient	Amount	Percent (%)
Gender		
Male	40	58
Female	29	42
Age		
45-54 Years Old	18	26
55-64 Years Old	20	29
65-74 Years Old	31	45
HD frequency		
1 time / week	23	33,3
2 time / week	46	66,6

According to the statistics presented in table 1, the proportion of male CKD patients receiving hemodialysis in outpatient settings is 58%. Similarly, the findings of a study conducted by Kristina et al. (2021) indicate that the prevalence of hemodialysis among males surpasses that among females, with a rate of 57.14%. This substantial proportion indicates a higher prevalence of impaired renal function among males.

Gender-based characteristics indicate that the proportion of male patients with chronic renal disease having hemodialysis is higher, specifically 59.46%, in comparison to female patients. This is in accordance with the 2015 IRR, where the highest incidence of gender in cases of chronic kidney disease was men (54.70%) (Rohenti et al., 2019).

Research conducted by Azhari (2020) was 61.76%. This is due to the process of inhibiting the hormone estrogen in women so that the process of forming cytokines is to avoid osteoclasts so that excessive bone calcium absorption does not occur so that calcium levels in the bones are still within normal limits. This calcium is useful for preventing the absorption of oxalate which can cause the formation of kidney stones. Kidney stones are one of the risk factors that can cause CKD.

The majority of individuals who undergo hemodialysis fall between the age range of 65 to 74 years, accounting for 45% of the total population. Subsequently, the 55-64 age bracket secured the second position, accounting for 29% of the total. The process of ageing is linked to a decline in kidney function, which is characterised by a reduction in glomerular excretion rate and a deterioration in tubular function. The incidence of chronic kidney disease (CKD) is influenced by advancing age, as the glomerular filtration rate (GFR) component diminishes with advancing age (Saputra et al., 2020).

Age is a significant determinant of alterations in renal function that occur as a consequence of the ageing phenomenon. A reduction in renal mass is observed within the age range of thirty to eighty years, whereas a deterioration in renal function becomes evident around the age of fifty (Rachmawati et al., 2019).

Analysis of direct medical costs of CKD patients undergoing hemodialysis

Analysis of direct medical costs for CKD patients with hemodialysis at RSUD dr. Moewardi, for outpatients with a total of 69 treatment episodes for the period October-December 2022, it reached Rp. 70,129,389.00 with an average of 23,376,463.00.

Table 2. Components of direct medical costs for outpatient hemodialysis patients

Cost Component (Treatment Episode)	**Total Cost (Rupiah) (%)**	**Average ± SD**
Adminitartion Cost (69)	5.457.000,00 (7,6%)	79.086,95±2.281,43
Package Cost (69)	62.265.600,00 (88%)	902.400,00±0,0000
Drug Cost (65)	2.406.789,00 (3,4%)	37.027,52±32.598,68
Total	70.129.389,00	23.376.463±33.713.494

Costs for outpatients consist of administration costs, then hemodialysis package costs and drug costs. The cost of the hemodialysis package is the largest cost component, reaching a total cost of IDR 62,265,000.00 (88%). The cost of the medicine itself is not that high because for outpatients, not all patients are given medicine.

Comparison of hospital rates and INA-CBG's rates

Outpatients also showed that the results obtained were that there was a significant difference ($p<0.05$) between the average real costs and the INA-CBG package rates.

Table 3. Comparison of hospital rates and INA-CBG's rates in outpatient CKD patients on hemodialysis

Grouping INA-CBG'S	**Class**	**N**	**INA-CBG's Rate (Rp)**	**Average Hospital Rates (Rp)**	**SD (Rp)**	**P**
N-3-15-0	-	69	1.380.582,00	1.019.760,72	33.887,28	0,000

Azalea et al. (2016) posit that the higher rates observed in INA-CBG compared to hospitals can be attributed to the significant influence of service output, encompassing both primary and secondary diagnoses, as well as the procedures performed throughout the process. Upkeep. The codes and descriptions provided by INA-CBG do not consistently pertain to a singular diagnosis, but rather can arise from either a singular diagnosis or a compilation of diagnostic methods.

Likewise, in research conducted by Fauziah et al, (2015) for outpatients, the large drug costs incurred were due to hemodialysis patients experiencing complications or side effects from the hemodialysis therapy being carried out, so that hemodialysis patients required additional medication.

Based on the research results of Rohenti et al, (2019), real costs are lower compared to the higher rates provided by the government (INA-CBG's). it can be said that the hospital experienced a profit because the real costs turned out to be lower than the tariffs determined by hospitals and tariffs set by the

government (INA CBGs). But with That amount of profit cannot be said to be a profit for the hospital because it exists fixed costs that must be calculated.

Likewise, research by Soetedja et al (2022) shows that there is a significant difference between INA-CBG's rates and unit costs for hemodialysis services carried out on outpatients and inpatients. Therefore, hospitals must calculate unit costs correctly, so that they can help hospital management in controlling costs and preventing hospitals from losses (Soetedja et al., 2022).

DISCUSSION

Renal chronic illness is a global public health concern. Kidney failure is becoming more common and more expensive in the United States, with unfavorable results.The frequency of chronic renal disease in its initial stages is even higher. A growing body of research over the past few decades suggests that the negative impacts of chronic kidney disease, including kidney failure, cardiovascular disease, and premature death can be avoided or delayed. (National Kidney Foundation, 2002).

The male gender criteria are more likely to undergo hemodialysis because one of them is lifestyle, on average more men smoke and drink alcohol so this can be a risk factor for CKD. Because according to the results of research that has been carried out, almost all Chronic Kidney Disease patients consume energy supplements, most do not drink enough water, almost half of the patients in the Hemodialysis Room have a history of smoking, and almost half of them. also consume herbal medicines (Dewi, 2018).

The majority of publications examining the risk factors for chronic kidney disease in adulthood identified older age, gender, ethnicity, family history of kidney disease, hypertension, diabetes mellitus, kidney stones, obesity, dyslipidemia, and smoking as significant contributors. Age is a significant risk factor that should not be disregarded in relation to the incidence of various diseases. The process of ageing, often known as the ageing process, encompasses a range of molecular, structural, and functional alterations that occur in many organ systems, including the kidneys (Arriyani & Wahyono, 2023) (Liu et al., 2021).

Increasing number of patients at this age Older age is associated with increased fibrosis kidneys leading to glomerosclerosis, interstitial fibrosis, tubular arthrosis, sclerosis vascular disease, and loss of kidney function (Fauziah et al., 2015).

The overall cost of medical services offered by hospitals is subject to variation based on the type of treatment provided, encompassing medication, nursing care, consultations, doctor visits, and facility services such as hospital facilities, medications, and consumable medical equipment. The determination has been established in Article 13 of Regional Regulation Number 1 of 2009. Regarding INA-CBG's tariffs, the determination of medical services is contingent upon service packages that are structured according to groups of disease diagnoses and corresponding activities (Agustina et al., 2020).

For outpatients, there is a difference in INA-CBG's rates because some patients are given the drug. Meanwhile, drugs is not included in the BPJS claim.

The rates of INA-CBGs are determined by utilising cost data and disease coding data that are derived from the International Classification of Diseases (ICD) established and compiled by the World Health Organisation (WHO). Additional The determining factor pertains to the allocation of employee salary expenses across all hospital operations. This includes variations in doctor service rates, consumable usage, medication and diagnostic procedures, as well as hospital policies governing the scope of services offered during hemodialysis procedures, such as dialyzer reuse and laboratory examination scheduling (Fibionisa et al., 2023).

CONCLUSIONS AND RECOMMENDATIONS

The direct medical costs of CKD with hemodialysis for 69 outpatient patients based on the hospital perspective for the period October to December are IDR 70,129,389.00. There is a significant difference between real costs and INA-CBG's package rates for CKD patients on hemodialysis at N-3-15-0.

ADVANCED RESEARCH

In this study, the coverage assessed is only INA-CBG's claim rates for hemodialysis, so this is not yet globally representative of assessing the difference in real hospital costs and INA-CBG's rates, and this research is only based on the hospital's perspective so it needs to be examined based on that perspective. others such as patient perspective etc.

In addition to explicit expenses, there exist indirect expenses or overhead expenses, including regular and general costs that cannot be directly attributed to the hemodialysis procedure. These include indirect labour costs, cleaning material costs, stationery expenses, general maintenance costs, and miscellaneous costs. Costs associated with overhead can be categorised into two main types: Direct Resource Overhead costs and Indirect Resource Overhead costs.

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