



## The Costs of Medical Services at A Regional Hospital in Vietnam

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### Abstract

This study was intended to analyze the unit costs of medical services at Thu Duc General Regional Hospital (TDH) in Vietnam during the fiscal year 2019. A retrospective cost analysis was conducted using the activity-based costing method. Cost data covering 2019 were analyzed and presented in both Vietnamese dong (VND) and international dollar (Int\$). The unit costs of medical services were estimated using the average cost method. As a result, in 2019, the total cost of medical services at TDH was 286,934,591,322 VND (38,496,263 Int\$). Material costs accounted for the largest proportion of the cost structure. The unit costs of medical services ranged from 26,432 VND (3.55 Int\$) to 21,305,814 VND (2,858.47 Int\$), depending on patterns of the services. In conclusion, the findings can be used to support hospital management and serve as a reference for TDH's estimation of its budget under the fee-for-service payment method. The costing method used in this work can be generalized to other Vietnamese hospitals of the same level as TDH.

**Keywords:** cost analysis, hospital, medical services, Vietnam

### 1. Introduction

In Vietnam, hospitals are the first point of contact for the majority of Vietnamese citizens, which accommodate more than 50% of total health care visits (World Health Organization, 2018). In terms of finances, public hospitals in the country have been transitioning to financial and administrative autonomy - an initiative that is partly managed and supported by the government (The Government of Vietnam, 2015). Correspondingly, the revenue generated from the provision of medical services is a major source of these hospitals' budgets. The policy has also drawn a roadmap for revising medical service fees, through which public hospitals can be guaranteed to recover costs that were previously subsidized by the government (The Government of Vietnam, 2015). An important requirement, therefore, is for managers of public hospitals to understand how budgets are allocated within and among departments to ensure the delivery of medical services at acceptable quality levels and affordable costs.

The costs of medical services analysis relate to analyzing the cost structure and then estimating the costs of delivering one particular medical service (Conteh & Walker, 2004; Ozaltin & Cashin, 2014). These results might benefit health planners and managers in different aspects including discussions on affordability and financial sustainability, cost-effectiveness analysis, or the comparative assessment of efficiency in different settings (Beck et al., 2012). It also serves as basic information for establishing reimbursement rates by social security systems or setting user fees at an acceptable level of quality and affordable price (Conteh & Walker, 2004). In addition, it could be useful to determine budgets to run medical services or make cost projections (Prinja et al., 2016).

In respect of cost data in Vietnam, few studies have explored the actual costs of medical services provided by hospitals. Most costing studies in the country highlight the costs of delivering particular services for specific diseases, such as pneumonia, acquired immunodeficiency syndrome, and cervical cancer (Anh et al., 2010; Duong et al., 2014; Nguyen et al., 2018). The problem is that such expenses cannot be generalized

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to other illnesses. Moreover, some studies are over a decade old, thus limiting their application in the current context, wherein changes have occurred in disease patterns, economic situations, and population sizes (Anh et al., 2010; Flessa & Dung, 2004; Minh et al., 2010). The hospital under the study is Thu Duc General Regional hospital (TDH) in Ho Chi Minh City, the largest city in southern Vietnam. In 2015, a study on the cost of medical services was conducted in that hospital (Vo et al., 2018). That study retrieved cost data in 2014 and employed the standard costing method to analyze the cost. Even though cost information should be collected as a routine because resource use has changed over time, there has been no updated cost study in order to re-evaluate the medical service costs as well as the cost structure of that hospital for five years.

In consideration of these issues, the present research explored the cost structure at a regional hospital in Vietnam and estimated the unit costs of its medical services to provide basic information on the management of budgets.

## 2. Objectives

- 1) To explore the cost structure at Thu Duc General Regional hospital in Vietnam
- 2) To estimate the unit costs of medical services provided at the hospital to provide basic information on the management of budgets.

## 3. Materials and Methods

### 3.1 Study setting and design

A cost analysis of medical services at Thu Duc General Regional Hospital (TDH) was carried out using a standard costing method. TDH is a secondary hospital located in Ho Chi Minh City with a capacity of 700 beds (Berman et al., 1990). All costs were estimated on the basis of data that were compiled from January to December 2019 to capture a complete budgeting cycle and minimize seasonal effects.

### 3.2 Costing procedure and data collection

The hospital's organizational structure was examined to identify cost centers, that were classified as either transient cost centers (TCCs) or absorbing cost centers (ACCs). ACCs were defined as direct patient service centers that cover ancillary, outpatient, and inpatient services. TCCs included supportive cost centers that provide support for patient care. The direct costs incurred by each cost center were calculated through a summation of its capital, material, and labor costs.

#### *Direct cost determination*

Capital costs comprised the costs of capital assets and building depreciation. The consumer price index retrieved from the World Bank database (World Bank, 2020) was used to adjust the price of capital assets. The useful life (in years) of capital assets was determined following the regulations of the Vietnamese Ministry of Finance (Vietnam's Ministry of Finance, 2018). Building costs were assigned to each cost center based on the space that its building/office spans. With the accounting approach, depreciation costs were calculated by dividing the original price at which capital assets were purchased by the useful life of such assets (Walker & Kumaranayake, 2002). Depreciation costs were also calculated via the economic approach using the replacement cost adjusted on the basis of the consumer price index and the annuity factor; a discount of 3% was applied in this study, following previous costing analyses conducted in the Vietnamese context (Anh et al., 2010; Chi, 2016; Linh & Trung, 2016; Tran et al., 2018; Vo et al., 2018).

Labor costs covered the salary of each personnel and other general expenses, including transport allowances, recruitment costs, uniform costs, and expenses related to annual training. Details regarding the salary received by each staff were determined on the grounds of staff income statistics by month for the entirety of 2019. Other expenses were apportioned on the basis of the full-time equivalent in each cost center.

Material costs were defined as the total expenses on drugs, medical supplies, utilities, outsourcing/hiring, equipment, and miscellaneous items. Adjustments were made to drug costs. As reported by the finance and accounting department of TDH, drug expenditures, which are supposed to be the cost of the pharmacy, were counted in the Outpatient, the Traditional medicine, and the Inpatients as outpatients' and inpatients' prescriptions. Therefore, these data were recalculated. All drug costs incurred by the inpatient,



outpatient, and traditional medicine departments were summed as expenditures of the pharmacy department. These costs were allocated to each cost center in accordance with appropriate criteria, except for the costs of drugs, medical materials, and consumables, for which available data from financial reports were used.

#### *Indirect cost allocation*

Direct costs from the TCCs were transferred to the ACCs through a simultaneous equation method (Drummond et al., 2015), with appropriate allocation bases.

#### *Total cost calculation*

To obtain the total costs incurred by each ACC, the direct costs of each ACC and the indirect costs of relevant TCCs were summed. All the costs were incurred in the local currency, Vietnam dong (VND), but the results of this work are presented in both VND and international dollars (Int\$); for this purpose, the average exchange rate in 2019 (7,454 VND = 1 Int\$) was used (The state bank of Vietnam, 2020). International dollars were used to adjust for variations in location to compare the costs of services in different countries (Turner et al., 2019).

#### *Unit cost computation*

To compute the unit costs of medical services, the average cost method was employed. The unit cost of output was calculated by dividing the total costs of a cost center by the number of its outputs. The number of cost center's outputs (i.e., patient days, admissions, beds, prescriptions, and outpatient visits) was determined on the basis of the hospital's activity report for 2019 (The General planning department of Thu Duc General Regional Hospital in Vietnam, 2019). Descriptive statistics were used to present the results of this study.

### 3.3 Ethical considerations

The study obtained ethical approval from the International Review Board on September 7, 2020 (approval number: 937/2020/BVDDKKVTD\_HDYD). Also, the study method and results have been conducted following the hospital disclosure and got approval before publication.

## 4. Results and Discussion

### 4.1 Results

Nine TCCs and 23 ACCs were identified at TDH.

#### *Direct costs*

Table 1 shows the composition of the direct costs of all the cost centers at the case hospital. The total direct costs of TDH in 2019 amounted to 286,934,591,322 VND (38,496,263 Int\$). Material costs accounted for the largest proportion of the direct costs incurred by all the cost centers (175,514,252,242 VND or 23,547,676 Int\$). In detail, the largest component of the direct costs was the cost of drugs (33.31%), followed by salaries (32.84%).

**Table 1** Composition of direct costs at TDH in 2019

Cost	Items	VND	Int\$	%
Material	Utilities	5,543,880,865	743,789	1.93
	Outsource, hire	5,954,601,295	798,893	2.08
	Drugs	95,581,543,553	12,823,592	33.31
	Medical materials and consumables	58,827,342,877	7,892,506	20.5
	Office materials and other items	9,606,883,653	1,288,897	3.35
	<b>Subtotal</b>	<b>175,514,252,242</b>	<b>23,547,676</b>	<b>61.17</b>
Labor	Salaries	94,218,715,712	12,640,750	32.84
	Others*	2,706,926,440	363,172	0.94
	<b>Subtotal</b>	<b>96,925,642,152</b>	<b>13,003,922</b>	<b>33.78</b>
Capital	Building	871,861,617	116,972	0.3
	Equipment	13,622,835,310	1,827,693	4.75



Cost	Items	VND	Int\$	%
	<b>Subtotal</b>	<b>14,494,696,927</b>	<b>1,944,665</b>	<b>5.05</b>
	<b>Total</b>	<b>286,934,591,322</b>	<b>38,496,263</b>	<b>100</b>

Note: \*Others included transport allowance, recruitment, uniform, and training. All cost values were adjusted to the year 2019/ 1 Int\$=7,454 VND

The proportions of material, labor, and capital costs in each cost center are presented in Figure 1. Within an individual cost center, labor costs were the main contributor to the expenses incurred by most of the TCCs, except for the information technology department (A7). In the ancillary cost centers (B1 to B4), material costs represented the largest proportion of expenses. In outpatient cost centers (C1 to C3), labor costs were the highest, similar to the case of all inpatient cost centers, except for the nephro-urology (D5) and ophthalmology (D16) wards.

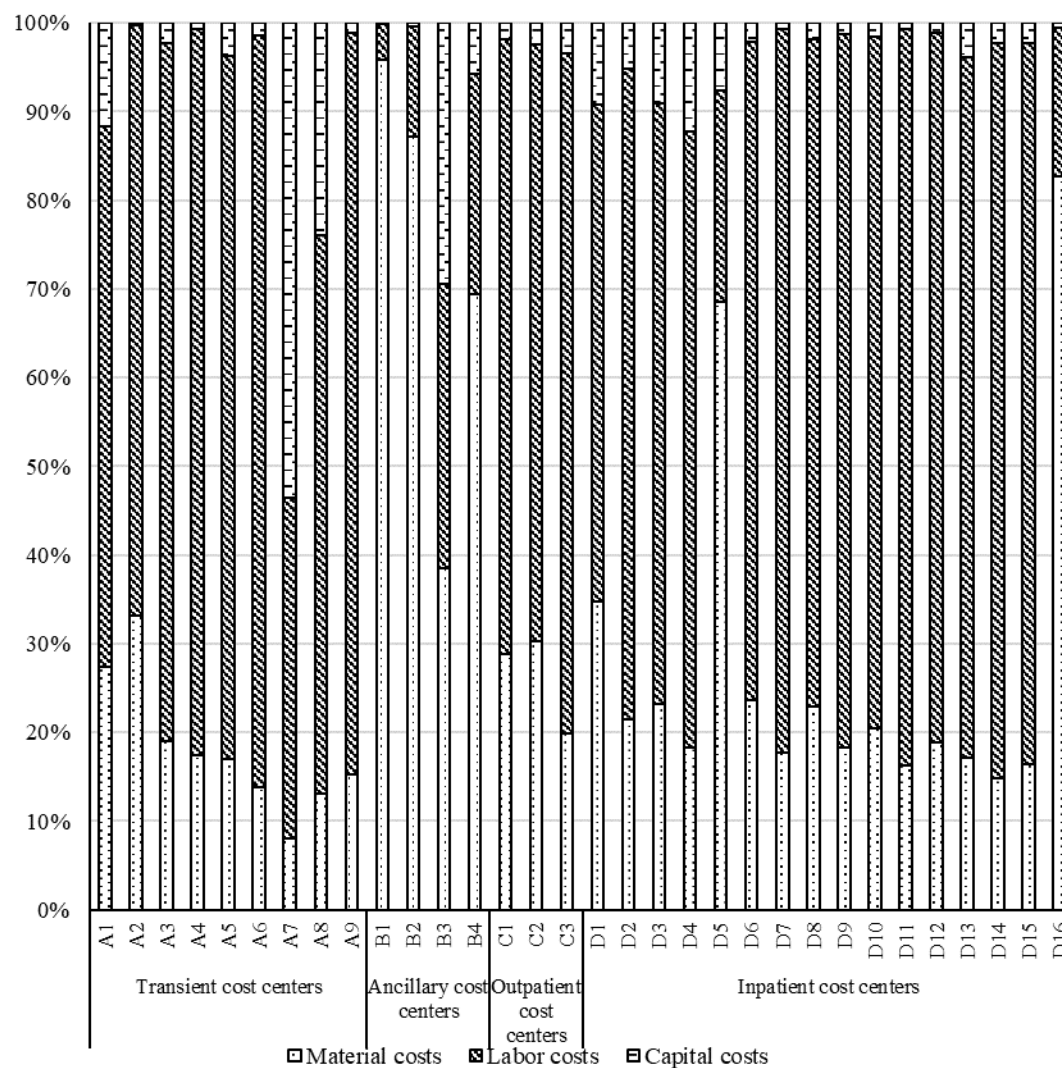


Figure 1 Distribution of direct cost components across cost centers

**Table 2** Unit costs of medical services at TDH in 2019

Code	Cost center	Unit of output	Unit costs VND	Int\$
B1	Pharmacy	Prescription	191,282	25.66
B2	Laboratory	Test	26,432	3.55
B3	Radiology	Service	90,540	12.15
B4	Anesthesiology	Surgery	2,640,885	354.31
C1	General outpatient department	Visit	28,934	3.88
C2	Emergency	Visit	270,646	36.31
C3	Traditional medicine	Visit	46,608	6.25
Overall outpatient services		Visit	44,222	5.93
D1	Intensive care and toxic management	Case	21,305,814	2,858.47
		Patient-day	2,194,175	294.38
D2	General medicine	Case	1,468,009	196.95
		Patient-day	209,402	28.09
D3	Cardiology	Case	2,069,046	277.59
		Patient-day	219,897	29.50
D4	Gastroenterology	Case	1,472,588	197.57
		Patient-day	217,779	29.22
D5	Nephro-Urology	Case	3,422,426	459.17
		Case	2,294,753	307.87
D6	Endocrinology	Patient-day	198,343	26.61
		Case	1,404,801	188.47
D7	Infectious diseases	Patient-day	195,021	26.16
		Case	1,146,147	153.77
D8	Pediatrics	Patient-day	208,090	27.92
		Case	1,926,437	258.46
D9	Surgery	Patient-day	258,375	34.66
		Case	3,229,860	433.33
D10	Neurosurgery	Patient-day	355,557	47.70
		Case	3,074,142	412.44
D11	Orthopedic surgery	Patient-day	367,834	49.35
		Case	2,288,252	307.00
D12	Urological surgery	Patient-day	329,988	44.27
		Case	2,104,451	282.34
D13	Obstetrics and Gynecology	Patient-day	280,196	37.59
		Case	2,284,693	306.52
D14	ENT	Patient-day	306,242	41.09
		Case	2,808,660	376.82
D15	Odonto-Stomatology	Patient-day	359,527	48.24
		Case	4,582,306	614.78
D16	Ophthalmology	Patient-day	1,460,516	195.95
		Case	2,409,682	323.29
Overall Inpatient services		Patient-day	345,497	46.35

Note: All cost values were adjusted to the year 2019/ 1 Int\$=7.454 VND

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#### *Unit costs of medical services*

The unit costs of the 23 ACCs, calculated using the average cost method, are presented in Table 2. With regard to ancillary services, the unit cost per prescription dispensed by B1 was 191,282 VND (25.66 Int\$), whereas those for laboratory tests and radiology services were 26,432 VND (3.55 Int\$) and 90,540 VND (12.15 Int\$), respectively. Surgery performed in B4 cost 2,640,885 VND (354.31 Int\$). In the outpatient cost centers (C1 to C3), the overall unit cost per outpatient visit was 44,222 VND (5.93 Int\$), of which the unit cost of emergency visits was the highest at 270,646 VND (36.31 Int\$). In the inpatient cost centers (D1 to D16), the overall costs per case and per patient day were 2,409,682 VND (323.29 Int\$) and 345,497 VND (46.35 Int\$), respectively. Variations in inpatient costs occurred across departments. The average cost of inpatient cases varied from 1,146,147 VND or 153.77 Int\$ (D8) to 21,305,814 VND or 2,858.47 Int\$ (D1). Meanwhile, the average expense per inpatient day varied from 195,021 VND or 26.16 Int\$ (D7) to 2,194,175 VND or 294.38 Int\$ (D1).

#### *4.2 Discussion*

The total costs of TDH in the fiscal year 2019 amounted to 286,934,591,322 VND or 38,496,263 Int\$. Material costs accounted for the largest proportion (61.17%) of the overall expenses in the hospital, originating mainly from drug-related costs (95,581,543,553 VND or 12,823,592 Int\$), followed by labor costs (33.78%) and capital costs (5.05%). Material and labor costs were much higher compared with capital costs. We also found that the majority of labor costs were accounted for by the general outpatient department. There were numerous outpatient visits in 2019—586,964 visits, which corresponded to more than 2,300 visits per day; accordingly, many employees were needed to serve such patients. Understandably, the number of employees in the general outpatient department was the highest among all the departments in the hospital.

The findings were compared with those of Flessa et al.'s study of five hospitals in Vietnam: two district hospitals (Van Dinh Hospital and Binh Luc Hospital), two provincial hospitals (Thai Nguyen Hospital and Thai Binh Hospital), and one central hospital (Bach Mai Central Hospital) (Flessa & Dung, 2004). The authors collected data in 2000 and similarly used the standard costing method to determine the cost structures and unit costs incurred by these health care institutions. The cost structure in our case hospital is consistent with those of the hospitals of the same level as ours (i.e., Thai Nguyen Hospital and Thai Binh Hospital) and the higher-level institution (Bach Mai Central Hospital) in terms of the ratio of material costs to labor and capital costs. These ratios indicate that material costs were the largest proportion compared with the two other cost components in these hospitals. These results can help hospital directors pay attention to material costs if they wish to decrease such expenses in their hospitals. However, the cost structure in the present study was not in the same direction as those of the lower-level hospitals in Flessa et al.'s work (i.e., Van Dinh Hospital and Binh Luc Hospital), where labor costs were the most important expenses. This difference suggests that cost importance depends on the level of health care provided by Vietnamese hospitals.

The unit costs of medical services in the current research varied, depending on the volume of services and the resources used by each cost center. The hospital provided considerably more laboratory services (tests) (913,044) than radiological services (247,981), but they differed minimally in terms of contribution to total costs (i.e., approximately 8.02% and about 7%, respectively). The high costs of radiology services could be due to the expensive equipment used in the radiological department compared with that employed in the laboratory (Ghilan et al., 2021). The unit costs of some specialty departments for inpatients were also high because of expensive equipment and the lower number of patients serviced; examples are the intensive care and toxic management departments. The same is the case with the ophthalmology and neurosurgery departments, with the former registering the second-highest unit costs and the latter having the third highest.

Flessa et al. also calculated the unit costs of medical services by dividing the total cost of each cost center by an appropriate measure of its output (number of outpatient visits, number of inpatient days) (Flessa & Dung, 2004). The comparison of their unit cost results with those in the present study showed that differences in such costs depend on the hospital level. In general, the directions of unit costs in the current work and those in Thai Nguyen Hospital and Thai Binh Hospital (the same level institutions as our case hospital) are similar, but the unit costs of medical services are lower than those of the central hospital (Bach



Mai) and higher than those of the district hospitals (Van Dinh and Binh Luc). Meanwhile, unit costs per radiology service and laboratory test diverged considerably among the hospitals. This might have been affected by the number of patients serviced and the cost of investment in medical equipment. Finally, the unit costs of medical services in the present research differ from those determined in studies conducted in India (Chatterjee et al., 2013), Cambodia (Jacobs et al., 2019), and Myanmar (Than et al., 2017). This difference implies that study location and pattern of resource utilization lead to differences in health care service costs.

The strengths of our study are, first, it used the standard costing method in analyzing hospital costs, which is the recommended approach in a manual on the costing of health services for provider payment (Ozaltin & Cashin, 2014) and in a manual for managers about hospital cost analysis (Donald et al., 2000). This method has also been used in other studies in many countries, including Vietnam, India, Thailand, and Bangladesh (Alam & Ahmed, 2010; Chatterjee et al., 2013; Flessa & Dung, 2004; Riewpaiboon et al., 2011). These can guarantee the reliability of the results. Second, there has been a paucity of research on hospital cost analysis in Vietnam, not to mention that these analyses were old-fashioned. The unit cost of medical services in this study can thus be served as a reference for other hospitals in Vietnam.

There are some limitations in this study. First, the output of the nephro-urology cost center was reported as cost per inpatient case, but the services provided by this cost center were completed within a few hours. This is because the hospital's protocol requires personnel to record services provided to inpatient cases for more than four hours as equivalent to one patient day. This result thus should be used with the caution on this issue. Second, some capital items supposedly cost nothing because they exceeded their useful life, and their inclusion might have caused an underestimation of capital costs. Another constraint was that the study was conducted at a single facility, which limited comparisons with hospitals that are of the same level in determining whether the costing management in the case hospital was of good quality. We endeavored to compare our research with previous studies, but the findings might have been affected by many factors, such as data input, data collection process, and data processing.

## 5. Conclusion

The study uncovered that material costs were the largest contributor to total costs compared with expenses on labor and capital. More attention should be focused on material expenditures if hospital managers want to reduce these costs. Given incomplete data in some cases, which could have affected the completeness of the analysis, the hospital managers should find a way to improve their data management as well as their data recording systems so that future studies can conduct better analyses. The current research has contributed to providing an updated cost analysis that can assist the hospital managers in terms of financial management. The procedure of the cost analysis can also be beneficial for policymakers in terms of developing standard costing guidelines for hospitals to adapt and use in the future. In addition, a training course on how to conduct cost analysis using the guideline could be taken into consideration in hospitals so that they can themselves analyze the cost structures of their organizations and then apply it to their service management.

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