COST ANALYSIS OF HOME PHARMACY CARE PROGRAM AMONG DIABETES PATIENTS IN PHARMACY

Analisis Biaya Program Home Pharmacy Care pada Pasien Diabetes di Apotek

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Abstract

Background: Home pharmacy care is expected to be able to provide a pharmaceutical care service that not only reduces the incidence of drug interactions and side effects but also increases the effectiveness of therapy and patient compliance in using drugs.
Aims: The study aimed to analyze the costs incurred for the home pharmacy care program for diabetic patients at the pharmacy.
Methods: This study decribed the cost required of running the home pharmacy care for diabetes patients. The sample was the pharmacist in charge of the pharmacies in the districts of Banyumas and Cilacap, Central java, which provides a home pharmacy care service program. The sample was conducted by purposive sampling method and the pharmacists were interviewed after they signed the informed consent. Break Even Point (BEP) was calculated to determine the number of patients who must be served in order to achieve the balance of expenses and income from providing the services. The cost analysis was performed using the activity-based costing (ABC) method.
Results: The lowest rate for home pharmacy care services is Rp.17,000, and the highest is Rp.31,000 without including home pharmacy care services. The average cost and revenue on providing the home pharmacy care was Rp.9,963 and Rp.22,000, respectively.
Conclusions: Pharmacies continue to benefit from the home pharmacy care program, and currently, there is no provision for home pharmacy care service rates.

Keywords: Activity Based Costing (ABC), Cost Analysis, Diabetes Mellitus, Home pharmacy care (HPC), Indonesia

Abstrak

__Latar Belakang:__ Diabetes melitus merupakan masalah kesehatan global dengan jumlah yang terus meningkat. Home Pharmacy Care diharapkan mampu memberikan pelayanan kefarmasian yang tidak hanya menurunkan kejadian interaksi obat dan efek samping tetapi juga meningkatkan efektivitas terapi dan kepatuhan pasien dalam menggunakan obat.
__Tujuan:__ Penelitian ini bertujuan untuk menganalisis biaya yang dikeluarkan untuk program home pharmacy care pada pasien diabetes di Apotek.
__Metode:__ Penelitian dilakukan terhadap apoteker penanggung jawab apotek di wilayah kabupaten Banyumas dan Cilacap yang telah menjalankan program pelayanan home pharmacy care. Break Even Point (BEP) dihitung untuk menentukan jumlah pasien yang harus dilayani. Analisis biaya dalam penelitian ini menggunakan metode activity based costing (ABC).
__Hasil:__ Biaya operasional yang dibutuhkan untuk menjalankan pelayanan home pharmacy care berkisar antara Rp.17.000 hingga Rp.31.000, diluar biaya obat untuk pasien. Sedangkan jasa profesi apoteker berkisar antara Rp.1.000,- hingga Rp.10.000,-. Secara umum, seluruh apotek mendapatkan keuntungan dari praktek pelayanan home pharmacy care.
__Kesimpulan:__ Praktek home pharmacy care berpotensi memberikan manfaat kepada apotek secara finansial, namun jasa profesi apoteker untuk melakukan analisis resep dan konseling perlu dirasionalisasi.

__Kata kunci:__ Analisa Biaya, Activity Based Costing (ABC), Diabetes Mellitus, Home Pharmacy Care (HPC), Indonesia

Introduction

Diabetes mellitus is one of the global health problems whose cases are still increasing (IDF, 2021). According to the International Diabetes Federation, there were 463 million adults with diabetes mellitus, and the prevalence was 9.3% globally. In 2045, it is estimated that the number of diabetes mellitus cases will increase by 45%, or equivalent to 629 million. As the fourth most populous country, Indonesia is in the seventh position with the largest number of people with diabetes in the world, with 10.7 million adults with diabetes and 97.5 million people with diabetes type II (Soewondo *et al.*, 2017; Blakely *et al.*, 2019; Saeedi *et al.*, 2019).

Increasing diabetes cases that continue to occur can be due to an unhealthy lifestyle, the number of failed therapies, or undisciplined patients undergoing therapy. Based on research conducted at Puskesmas throughout Bantul Regency in 2018, the majority of patients' clinical outcomes were not achieved (68.7%) because most patients had low adherence to taking antidiabetic drugs (57%) (Saibi, Romadhon, and Nasir, 2020). Meanwhile, a study conducted in Japan stated that 60% of diabetic patients forget to take their medication. To achieve the desired blood glucose level, patients must adhere to the rules of proper drug use, healthy diet, regular exercise, and self-monitoring of blood glucose (Inzucchi *et al.*, 2018; Ahola and Groop, 2018).

Pharmacists, through home pharmacy care, are expected to be able to provide pharmaceutical services that not only reduce the incidence of drug interactions and side effects but also increase the effectiveness of therapy and patient compliance in using drugs (Venturini *et al.*, 2017; Mulyagustina, Wiedyaningsih and Kristina, 2017). The PERMENKES Number 73 of 2016 has regulated the home pharmacy care service regarding the standard of pharmaceutical services in pharmacies. It is stated in paragraph (1) letter b in point e that one of the clinical pharmacy services is pharmaceutical services at home or called home pharmacy care. Based on previous research, home pharmacy care has positively contributed to improving the quality of life and glycemic control of diabetic patients. It is proven by the decrease in HbA1c of patients receiving home pharmacy care services, which is -0.66% (p-value 0.09) (Purwonugroho *et al.*, 2021). Another study showed that 57% of patients getting home pharmacy care services were compliant and had their blood sugar under control based on their MMAS-8 score and pill count. (Najiha *et al.*, 2017). Although several studies have proved the clinical benefits of home pharmacy care, there is currently no information available regarding the costs associated with providing these services. Therefore, this study aims to analyze the costs incurred for the home pharmacy care program at the pharmacy.

Method

This research was conducted on pharmacists in charge at Banyumas and Cilacap regencies who provided home pharmacy care services between 2017 and 2021, which were taken by purposive sampling method. Data collection was carried out online and offline with the following inclusion criteria: Responsible Pharmacist (*Apoteker Penanggung Jawab/ APJ*), pharmacists providing home pharmacy care services, and willing to participate in the study by signing informed consent. Despite the exclusion criteria being pharmacists who resigned during the study and from the research process, five pharmacists who met the criteria were obtained.

The cost of home care was calculated using the ABC (Activity Based Costing) analysis method by identifying the activities and resources that were required in order to provide the services. Furthermore, the total cost of activity per the total number of services provided was calculated. The BEP (Break Even Point) was calculated to weigh the profit and loss of pharmacies.

Cost data were obtained from pharmacists directly or based on normative prices if the informants did not know or forget the components of the costs incurred for home pharmacy care services. Cost

data were categorized into several groups based on the source of information. Cost data from sources include costs for advertising and promotion, purchasing electronic devices (HP and Computers), purchasing medical devices (devices for testing blood sugar), maintaining the devices, and buying diabetes drugs. Data were derived from resource persons and combined with assumptions, including the cost of reading prescriptions and consultation. Cost data derived from normative assumptions include the cost of electricity, credit/ internet, and administration (etiquette, packaging, informed consent, and documentation). Combining data from sources and these assumptions was necessary because the primary data obtained is data on the costs incurred by pharmacies each month for the operation of the entire pharmacy, not only for home pharmacy care services. Hence, it is necessary to assume that the proportion of these costs was used specifically for home pharmacy care services. The assumption was conducted by dividing the cost incurred by the pharmacy monthly by the number of services performed each month. Some cost data on this service needed to be assumed with normative data because there was no information from the source. Still, these costs were considered included in the operational costs of home pharmacy care services.

This study calculated the BEP to identify the amount of service needed to break even between the revenue received and the costs associated with providing PHC. This BEP calculation was carried out for two scenarios, including PHC when it was calculated with and without the drug cost. The BEP formula used in this study was as follows (Grala, 2020).

$$BEP = \frac{total\ fixed\ cost}{(selling\ price\ per\ unit - variable\ cost\ per\ unit\ of\ PHC)}$$

Result and Discussion

There were only a few patients receiving PHC services in the study (less than ten patients per month). Specific costs intended to provide PHC services were also not explicitly applied or charged to patients.

The cost component related to the pharmacist profession was only limited to reading prescriptions (3 out of 5 pharmacies) and pharmacist consultation rates (all pharmacies) when patients receive services at the pharmacy. Cost components in every home pharmacy care service included consulting services, blood sugar checks, transportation costs to patients' homes, electricity, credit, investments for communication tools, blood sugar checking tools, and drugs (Table 3).

The monthly costs incurred by each pharmacy to provide home pharmacy care services vary significantly among pharmacies. It was because each pharmacy offered a varied range of services. As a point of comparison, Barokah Farma Pharmacy incurred costs of Rp.917,790 (without medicine), and Rp. 1,206,410 (with medicines), while As Salam Pharmacy incurred costs of Rp. 13,419 (without medicine) and Rp.16,630 (with medicine). The comparison was obvious, even with the other three pharmacies. Due to the fact that Apotek Barokah Farma provided 80 home pharmacy care services per month while Apotek As-single Salam only provided one, the costs incurred each month would definitely be very different.

Table 1. Rates for Consulting Services and Reading Prescriptions (Rp)

Pharmacy name	Prescription reading service	Consulting services	Total
3S'mart	5,000	5,000	10,000
Barokah Farma	0	1,000	1,000
As Salam	0	2,500	2,500
Pasir	2,500	2,500	5,000
Desa	1,000	2,500	3,500

Based on table 1, service rates in home pharmacy care services only apply to prescription reading and consulting services, while home pharmacy care services have not been implemented. They provide consulting services and reading prescriptions with a maximum of Rp.10,000, and the lowest is Rp.2,500. The

difference in service rates is due to differences in the policies of each pharmacy in setting service rates. This policy is based on the community's characteristics around the pharmacy. As a result, some pharmacies set high service rates while others set relatively low service rates.

An overview of the cost of PHC per patient was necessary to provide an overview of the need for service costs and the potential economic benefits of PHC itself. PHC fees charged to patients included prescription reading services, temporary blood sugar checks, administration, and drugs (Table 3). The cost of electricity, credit/ internet, advertising/ promotion costs, investment in communication equipment and blood sugar checking equipment, and maintenance were not charged to the patients. Most pharmacies charge a pharmacist consultation service fee (4 out of 5 pharmacies), and only a Desa pharmacy exempts patients from it.

Viewing the table, Apotek Pasir was a pharmacy with the lowest capital and highest profit, with a capital of Rp.12,270 (including medicine) while making Rp.19,730 profit. The patient had to pay Rp.32,000 for home pharmacy services, whereas services devoid of drugs would have required Rp.10,345 in total. Apotek Pasir got a profit of Rp.15,655 from blood sugar check services, the sale of drugs, prescription reading services, and counselling services. The cost of checking blood sugar was the same compared to Barokah Farma, As Salam, and Desa pharmacies. In spite of this, the Pasir Pharmacy had implemented service rates for prescription reading and counselling services, taking significant profits from drugs.

Based on the identified cost components, BEP is also calculated to determine the number of patients who must be served so that the income and the amount spent are balanced in PHC practice. The calculation of BEP showed that 3S'mart had two drugs (with drug) and one drug (without drug), the highest BEP result was Barokah Farma, 32 drugs (with drug) and two drugs (without drug), while the lowest BEP with drugs was one drug

and without drug was one drug at Apotek As Salam, Pasir and Desa. It was known that the pharmacy could return the capital spent for one month if it could provide home pharmacy treatment for as many patients as BEP and that it would get more profit if it exceeded that amount (Table 2).

Table 2. Break Even Point (BEP)

Pharmacy Name	BEP With Drugs	BEP Without Drugs
3S'mart	2	1
Barokah Farma	32	2
As Salam	1	1
Pasir	1	1
Desa	1	1

Based on cost data analysis, it could be seen that pharmacies made an additional profit by providing home pharmacy care services. However, based on the pharmacist's information, the cost of this home pharmacy care service was still fully borne by the patient and the pharmacy. This would cause consideration for economically disadvantaged patients due to cost constraints, so most people are still reluctant to choose this service because BPJS or JKN do not cover it. However, based on research by Nakagawa and Kume, Indonesia can learn from Japan's success regarding home pharmacy care services, in which the national health insurance covers the cost of home pharmacy care for pharmacists who provide it. This policy was established in 2016 to strengthen community pharmacists in obtaining service recognition while providing patient-focused services, including home pharmacy care. The Japanese government recognizes that pharmacists can provide solutions to the problem of non-compliance with drug use to contribute to more efficient health financing (Nakagawa and Kume, 2017).

Previous studies have estimated the cost-effectiveness of pharmacy care plan services from a healthcare perspective. This study's results align with that study, which states that pharmacy care plan service can improve the patient's health

condition within 12 months. The study results also show that pharmacy care plan services can save treatment costs even in bad cases (Twigg *et al.*, 2019).

The home pharmacy care program at the pharmacy is a form of support for patients with chronic diseases such as diabetes. Previous studies have shown that these services are acceptable to patients, can lead to improved health outcomes, and result in modest cost savings (Seston *et al.*, 2020). A good relationship between patients and pharmacists also affects the handling of home pharmacy care. A study conducted by Alzubaidi *et al.* showed a less effective relationship with community pharmacists when their prescriptions were filled. The expertise of community pharmacists appears to be underutilized. This minimal relationship reduces the chances of optimally promoting health outcomes (Alzubaidi, Mc Namara, and Versace, 2018). Previous research in Central Java showed that home pharmacy care is rarely practiced in Cilacap. Still, it must be selectively implemented because it is supported by doctors, nurses, and patients (Nurfauzi *et al.*, 2020).

From the results of the cost analysis, it can be compared with the results of Wang Y's 2018 study, which states that pharmacist-managed services have a positive return in terms of economic feasibility with an average cost per 10.9-mmol /mol (1%) reduction in HbA1c of $ 160 ($174 in 2014 US dollars) per patient. The comparison is significantly different from service rates in Cilacap and Banyumas.

It is also supported by the 2017 study by Janati *et al.*, which stated that home-based care strategies are more dominant than hospital-based care in terms of lower costs for reducing HbA1c levels in diabetic patients. The results of the study also show that a home-based care approach can save the average cost of diabetes treatment by about 61%. (Janati *et al.*, 2017)

Table 3. Pharmacy Fee Data Per Month and Cost Data Per Patient

Services	Cost Type	3S'mart	Barokah Farma	As Salam	Pasir	Desa	$\overline{X}$ (Average)
Number of patients		7	8	1	2	1	4
		Once a month	Every 3 days	Once a month	Once a month	Once a month	
Pharmacy Fee Data Per Month (Rp)							
Prescription Reading Service**	Capital	35,000	0	0	5,000	1,000	13,667
	Charge	70,000	0	0	10,000	2,000	27,333
Consulting Services**	Capital	35,000	80,000	2,500	5,000	2,500	25,000
	Charge	70,000	160,000	5,000	10,000	0	49,000
Blood Glucose Check*	Capital	22,400	240,000	3,000	6,000	3,000	54,880
	Charge	70,000	1,200,000	15,000	30,000	15,000	266,000
Transportation*	Capital	5,872	23,490	85	240	221	5,982
	Charge	0	0	0	0	0	0
Electricity***	Capital	2,632	30,080	376	752	376	6,843
	Charge	0	0	0	0	0	0
Credit/internet***	Capital	4,200	48,000	600	1,200	600	10,920
	Charge	0	0	0	0	0	0
Administration***	Capital	7,000	0	2,000	2,000	1,000	2,400
	Charge	7,000	0	2,000	2,000	1,000	2,400
Advertisement/ promotion*	Capital	0	3,680	0	0	91	1,886
	Charge	0	0	0	0	0	0
Electronic devices*	Capital	1,596	10,400	7	456	96	2,511
	Charge	0	0	0	0	0	0

Services	Cost Type	Pharmacy Name					$\overline{X}$ (Average)
		3S'mart	Barokah Farma	As Salam	Pasir	Desa	
Medical device*	Capital	91	1,040	13	42	13	240
	Charge	0	0	0	0	0	0
Maintenance*	Capital	0	5,520	0	0	208	2,864
	Charge	0	0	0	0	208	208
Drugs*	Capital	12,659	611,380	1,789	3,850	1,925	126,321
	Charge	45,500	900,000	5,000	12,000	3,000	193,100
Totally with drugs	Capital	126,450	1,053,590	10,370	24,540	11,030	245,196
	Charge	262,500	2,260,000	27,000	64,000	21,208	526,942
SD	Capital	13,108	178,171	1,128	2,275	1,019	
	Charge	31,733	410,096	4,454	9,079	4,281	
Totally without drugs	Capital	113,791	442,210	8,581	20,690	9,105	118,875
	Charge	217,000	1,360,000	22,000	52,000	18,208	333,842
SD	Capital	13,730	70,807	1,143	2,310	1,016	
	Charge	32,355	360,202	4,583	9,264	4,471	
Cost Data Per Patient (Rp)							
Prescription Reading Service**	Capital	5,000	0	0	2,500	1,000	2,833
	Charge	10,000	0	0	5,000	2,000	5,667
Consulting Services**	Capital	5,000	1,000	2,500	2,500	2,500	2,700
	Charge	10,000	2,000	5,000	5,000	0	4,400
Blood Glucose Check*	Capital	3,200	3,000	3,000	3,000	3,000	3,040
	Charge	10,000	15,000	15,000	15,000	15,000	14,000
Transportation*	Capital	838	294	85	120	221	312
	Charge	0	0	0	0	0	0
Electricity***	Capital	376	376	376	376	376	376
	Charge	0	0	0	0	0	0
Credit/internet***	Capital	600	600	600	600	600	600
	Charge	0	0	0	0	0	0
Administration***	Capital	1,000	0	2,000	1,000	1,000	1,250
	Charge	1,000	0	2,000	1,000	1,000	1,250
Advertisement/ promotion*	Capital	0	46	0	0	91	69
	Charge	0	0	0	0	0	0
Electronic devices*	Capital	228	130	7	228	96	138
	Charge	0	0	0	0	0	0
Medical device*	Capital	13	13	13	21	13	15
	Charge	0	0	0	0	0	0
Maintenance*	Capital	0	69	0	0	208	139
	Charge	0	0	0	0	0	0
Drugs*	Capital	1,808	7,642	1,789	1,925	1,925	3,018
	Charge	6,500	11,250	5,000	6,000	3,000	6,350
Totally with drugs	Capital	18,063	13,170	10370	12,270	11,030	12,981
	Charge	37,500	28,250	27,000	32,000	21,000	29,150
SD	Capital	1,873	2,227	1,128	1,137	1,019	
	Charge	4,533	5,126	4,454	4,539	4,288	
Totally without drugs	Capital	16,255	5,528	8,581	10,345	9,105	9,963
	Charge	31,000	17,000	22,000	26,000	18,000	22,800
SD	Capital	4,622	4,503	4,583	4,632	4,478	
	Charge	1,589	2,307	1,148	1,088	1,069	

Description: *original data, **original data and assumptions, ***assumption data

Original Research

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Pharmacist-managed services have a positive return in terms of economic viability. With the increasing role of pharmacists in the healthcare sector, it can increase positive health outcomes. (Wang, Yeo and Ko, 2018) The RCT study in Jordan recommends that from a cost analysis point of view, home pharmacy care provides significant savings when compared to hospital care (Al-Qudah *et al.*, 2020). Home medication review by community pharmacists (HMR-CP) is a cost-effective intervention that significantly reduces HbA1c among T2DM patients. However, it is associated with a higher average total cost per participant (Rosli *et al.*, 2021).

This use of ABC (Activity Based Costing) analysis method for this cost analysis in this study has the advantage that results of this study are based on the activities carried out. The cost data obtained from respondents (APJ) is data on costs incurred for home pharmacy care services and overall pharmacy operational costs. So, researchers must reprocess the cost data obtained to determine the cost of home pharmacy care services. Further study using experimental techniques is required in order to obtain more accurate data.

Conclusion

Based on the analysis of the home pharmacy care costs from this study, it can be drawn that none of the respondents have set rates for home pharmacy care services. The total expenditure of pharmacies and patient expenses for home pharmacy care services also varies depending on the policy of the pharmacy/ pharmacist and the patient's health. However, it is still within the Rp.17,000 to Rp.31,000 economic range. Therefore, the pharmacy can still make a profit (a pharmacy surplus) by providing this home pharmacy care service. However, the profit made is almost the same as those of pharmacy without home pharmacy services. This is because there is no set rate for home pharmacy care services. Thus, it is necessary to have clear policies related to pharmacy care service rates because the target market for home pharmacy care services was high.

Abbreviations

PHC: Pharmacy Home Care; HMR-CP: Home Medication Review Community Pharmacist; BEP: Break Even Point; ABC: Activity Based Costing; MMAS: The Morisky Medication Adherence Scale; BPJS/ JKN: *Badan Pengelola Jaminan Sosial/Jaminan Kesehatan Nasional*; HMR-CP: Home Medication Review-Clinical Pharmacy; T2DM: Type 2 Diabetes Mellitus

Declarations

Ethics Approval and Consent Participant
The study has been reviewed and approved by Universitas Muhammadiyah Purwokerto No KEPK/UMP/06/XII/2021

Conflict of Interest
All authors declare there is no conflict of interest in this manuscript

Availability of Data and Materials
Not applicable

Authors' Contribution
This study was conceptualized by KNH and DS, DS developed the methodology, KNH, DS, and GSP wrote, reviewed, and edited the manuscript, and KNH and DS also wrote the original draft.

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