

Time Driven Activity Based Costs of Community Pharmacy Drug Dispensing Services at Burapha University Hospital

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Abstracts

Background: Community pharmacy drug dispensing services (CPDDS) aim to enhance access to medical services. The service reduced hospital resource consumption. This study aimed to compare the cost of hospital pharmacy drug dispensing services (HPDDS) and CPDDS for stable hypertensive patients at Burapha University Hospital from a provider perspective.

Method: The costs were calculated using the Time-Driven Activity-Based Costing (TDABC) approach. Data were collected at hospital and drugstore through interviews and observation. The resource usage of HPDDS and CPDDS for stable hypertension treatment was identified.

Result: The processes of HPDDS and CPDDS included doctor services, nurse services, pharmacy services. By shifting patients from HPDDS to CPDDS, the hospital cost savings would be 294.68 THB per patient per year but drugstores would increase costs of 413.24 THB per patient per year.

Conclusion: From a hospital perspective, CPDDS is a cost-saving strategy compared with HPDDS for stable hypertensive treatment.

Keywords: Time-Driven Activity-Based Costing; Drug Dispensing Services; Community Pharmacies; Hospital

Introduction

Community pharmacy drug dispensing services (CPDDS) are drug dispensing services in Type 1 community pharmacies that aim to allow for better access to medical services and solve the overcrowding problem in hospitals. Patients with hypertension can participate the project. One of the leading causes of premature death worldwide is hypertension (Mohammed Nawi et al., 2021). The generation of costs associated with sickness complications includes not only those directly related to the primary condition, but also expenses incurred as a result of comorbidities and other chronic disorders (Prevolnik Rupel et al., 2023).

Many drugstores in Thailand provide services for stable chronic diseases, smoking cessation, contraceptive, sexually transmitted diseases treatment, and antibiotic smart use programs. (Chaiyakunapruk et al., 2016; Pongwecharak & Treeranurat, 2010; Sookaneknun et

al., 2010). CPDDS would enhance community pharmacists' role and responsibility in the Thai population.

Burapha University hospital is a reputed medical center in Chonburi province; it contains 400 inpatient beds. The overcrowding problem posed a massive challenge to drug dispensing service delivery. To cope with this situation, it was crucial for the hospital to implement CPDDS. Therefore, costs and resource utilization of the implementation of CPPDS must be evaluated to determine feasibility and sustainability.

Research Objective

The objective of this study was to compare the cost of CPDDS and hospital pharmacy drug dispensing services (HPDDS) for stable hypertensive patients at Burapha University Hospital.

Literature Review

There is an increasing number of patients receiving outpatient medical services in hospitals every year. The problem of hospital overcrowding impacts patient treatment outcomes because it reduces patient compliance to visit doctors at hospitals. The problem affects not only the patient but also the staff workload. The Ministry of Public Health, the National Health Security Office (NHSO), the Pharmacy Council, and the Community Pharmacy Association (Thailand) established CPDDS that allow patients to receive medication in drugstores. The project reduces the workload of medical personnel in hospitals. This is because it reduces the frequency of people's visits to hospitals (Kittiya Piyasin, 2022; Onanong Loatrakul, 2021; Roongnapa Khampang, 2021).

For CPDDS, hospitals provide medicines for individual patients and send them to drugstores for dispensing. The patient receives medicines at drugstores from community pharmacists. Community pharmacists monitor patients' drug use and provide data to the NHSO for reimbursement compensation. One hospital can cooperate with many drugstores, and patients can select drugstores that are close to their home (Kittiya Piyasin, 2022; Onanong Loatrakul, 2021; Roongnapa Khampang, 2021).

Time-driven activity-based costing (TDABC) is considered an activity based on cost and time. It calculates costs by process and activity. TDABC was used to calculate the cost of medical services by time and activity. The approach makes the cost calculation process easier by eliminating time-consuming steps. The benefit of this method is that it reduces the cost to organizations of traditional activities. It's easy to keep information up-to-date and use it to improve performance. Because it can display resources that are not yet in use (Houjazi et al., 2021; Rattanachotphanit et al., 2008; Zamrud & Abu, 2020).

Research Methodology

The costs of CPDDS and HPDDS in patients with a stable hypertensive were calculated from a provider's perspective. TDABC was used to calculate the costs used in each activity based on the time consumed. HPDDS patients received their medication every 2 months at Burapha University hospital. For CPDDS patients received the drug dispensing service from the hospital every 6 months and go to drugstore at month 2, 4, 8 and 10.

Source of Data

CPDDS and HPDDS costs were calculated from the interview and observation. In a hospital setting, data was obtained from hospital staff, which included doctors, nurses, pharmacists, and officers. For the drugstore, data was obtained from five community pharmacists in Chonburi province that participated in the CPDDS program. The costs of each strategy were calculated by staff costs and material costs using the TDABC approach. Staff costs in this study were estimated by average activity-based time per patient with stable hypertension and staff salary.

Population and Sampling

Purposive sampling was used to select hospital and drugstore staff for interviews and observations. Two doctors, nurses, pharmacists, and officers for service patients were selected. For drugstores, we used purposive sampling with five community pharmacists for data collection. The inclusion criteria were doctors, nurses, pharmacists, and officers who were more than 18 years old. The participants should work in outpatient services in the hospital for more than a year. In drugstores, the participants should work in drugstores for more than one year.

Data Collecting

To determine the time data for each activity, three individuals watched the staff perform each activity at least 8–10 times. Direct interviews were performed with staff who worked on each activity. The observed data were compared with the interview results to check the validity and reliability of the data. Doctor salary data was collected from the Medical Council of Thailand. Hospital nurse, pharmacist, and officer salaries were collected from the Ministry of Public Health. Community pharmacist salaries were collected from market prices.

Analysis of Data

All cost data for HPDDS and CPDDS were calculated to be compared for a 1-year time horizon by services and activities. All data analysis was conducted in Microsoft Excel version 2013.

Research Conceptual Framework

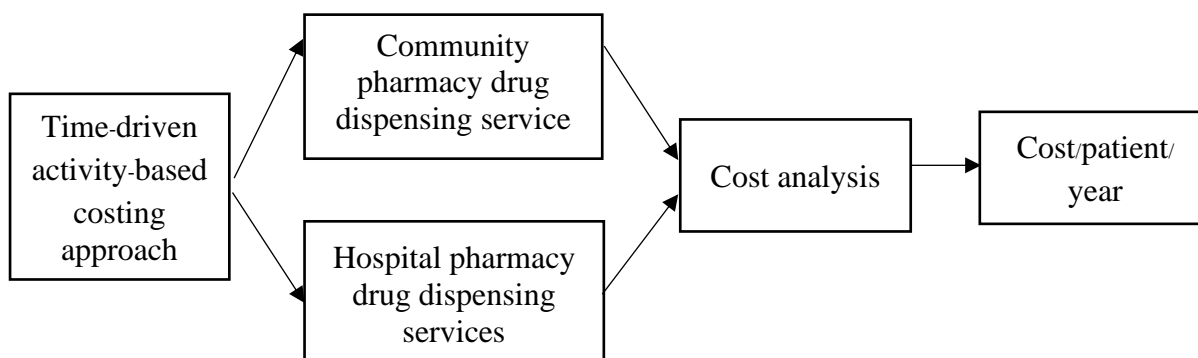


Figure 1 Research Conceptual Framework

Results

The results of the average time used for HPDDS are shown in Table 1. The total time for HPDDS per patient per visit was 29.78 minutes, which was calculated to cost 79.04 THB per visit. Since patients visited every 2 months (6 times per year), the total time of HPDDS was 178.68 minutes, which was calculated to cost 474.24 THB.

Table 1 Average time and cost of HPDDS per patient

Services	Activities	Time (min)		Cost (THB)	
		1 visit	6 visit	1 visit	6 visit
Patient registration	Patient screening	0.76	4.56	1.38	8.28
	Hospital registration	2.95	17.7	4.07	24.42
Nurse service	Patient history review	2.99	17.94	5.45	32.70
	Blood pressure measurement	1.59	9.54	2.9	17.40
Doctor service	Doctor visit	10.18	61.08	42.41	254.46
Officer service	Checking insurance scheme and payment	2.47	14.82	3.17	19.02
Pharmacy service	Prescription screening	2.11	12.66	5.94	35.64
	Drug preparation	2.85	17.10	2.77	16.62
	Drug checking	0.78	4.68	2.21	13.26
	Dispensing	3.10	18.60	8.74	52.44
	Total	29.78	178.68	79.04	474.24

For the CPDDS process, the hospitals arranged for medicines to be sent to drugstores twice a year. The total time per activity was 5.75 minutes, which was calculated to cost 10.74 THB per activity. Since the hospital arranged medicines twice a year, the total time of CPDDS in the hospital was 11.5 minutes, which was calculated to cost 21.48 THB. That is shown in Table 2.

Table 2 Average time and cost of CPDDS for the hospital per patient

Services	Activities	Time (min)		Cost (THB)	
		1 time	2 times	1 time	2 times
Hospital pharmacist prepare drug for drugstore	Prescription screening	1.99	3.98	5.62	11.24
	Drug preparation	2.97	5.94	2.89	5.78
	Drug checking	0.79	1.58	2.23	4.46
	Total	5.75	11.5	10.74	21.48

For processes that add on CPDDS. Since patients visited the hospital twice at months 1 and 6, and visited the drugstore four times at months 2, 4, 8, and 10. The number of times that patient visited the hospital was calculated from hospital time and cost data in Table 1, which was 59.56 minutes, which was calculated to cost 158.08 THB per year.

For drugstores, patients visit them four times per year. The results of the average time used for CPDDS are shown in Table 3. The total time for CPDDS per patient per visit was 36.72 minutes, which was calculated to cost 103.31 THB per visit. Since patient visits were four, the total time of CPDDS was 146.96 minutes, which was calculated to cost 413.24 THB.

Table 3 Average time and cost of CPDDS for drugstores per patient

Services	Activities	Time (min)		Cost (THB)	
		1 visit	4 visits	1 visit	4 visits
Community pharmacist Received drug from hospital	Drug checking	1.33	5.32	3.88	15.52
	Drug storage	1.84	7.36	1.61	6.44
Pharmacy service by Community pharmacist	Patient appointment	2.01	8.04	5.87	23.48
	Patient identification	1.16	4.64	3.38	13.52
	Blood pressure measurement	2.81	11.24	8.18	32.72
	Patient history review	4.72	18.88	13.76	55.04
	Drug checking	1.51	6.04	4.39	17.56
	Dispensing	5.76	23.04	16.78	67.12
	Recording	1.34	5.36	3.90	15.6
	Patient monitoring	9.41	37.64	27.43	109.72
	Reimbursement system	4.85	19.4	14.13	56.52
	Total	36.72	146.96	103.31	413.24

The average annual time spent on HPDDS, including all processes, was 178.68 minutes per patient. The total cost of HPDDS per patient per year was 474.24 THB. For CPDDS, the total annual hospital cost per patient was 179.56 THB (patient visits to the hospital two times can be calculated to cost 158.08 THB, and the cost of hospital pharmacists preparing drugs for drugstores two times is calculated to cost 21.48 THB), and the total annual community pharmacist costs per patient per year were 413.24 THB. The total cost of CPDDS per patient per year was 592.8 THB. The results of the average time used and cost per year for HPDDS and CPDDS are shown in Table 3.

Table 3 Average time used and cost per year for HPDDS and CPDDS

Service	Setting	Time (min)	Cost (THB)
HPDDS	Hospital	178.68	474.24
CPDDS	Hospital	71.06	179.56
	Drugstore	146.96	413.24

Discussion

From a hospital perspective, shifting patients from HPDDS to CPDDS would save 294.68 THB per year. The project reduces hospital resource usage because costs shift from the hospital to the drugstores. The total cost of CPDDS is higher than that of HPDDS. Because of the add-on processes in drugstores, community pharmacists have a higher salary than hospital pharmacists in Thailand (Ngosurachet et al., 2013).

HPDDS and CPDDS have different costs, depending on the perspective, and cannot be compared to determine which service is worthy. The perspective of the service provider determined which form would be suited to the context of the hospital. From the hospital's perspective, CPDDS reduces the work burden of the hospital. This agreed with the results of the study by Chalongsuk R. et al. (Chalongsuk et al., 2007) that compared prescription drug dispensing systems for chronic patients between hospitals and community pharmacies. The project helped reduce hospital burdens since the patients who joined the project received medication from drugstores. The project reduced the overcrowding of hospital outpatient departments. However, there was an unclear shift in the workload from hospital to drugstore.

When considered from the drugstore's perspective, CPDDS increased work burdens on the drugstores, but it promoted the role of community pharmacists among the population. The payer should consider providing compensation to drugstores for the additional service. Moreover, developing standard guidelines for CPDDS in drugstores is important to cover the needs of the service being provided. The guidelines would help motivate the drugstores that did not join the project to see the worthiness of joining.

This study has some limitations. Burapha University did not implement CPDDS when we collected the data. So, we assume many activities, like the current practice of stable hypertension patients. The researcher was unable to set an age range, determine the characteristics of illness or severity of the diseases, or ensure that each research participant had a similar illness condition. These patient characteristics may affect the time spent on each activity. Finally, this study did not calculate the costs of patients' medications and medical supplies that may deviate based on the level of severity of each patient's disease rather than on the time spent by staff in their practice. This can affect the calculated activity-based cost results.

Conclusion

From a hospital's perspective, CPDDS was a comparable cost-saving strategy to HPDDS for stable hypertensive treatment. The concerning issue here for future program development in regards to drugstores was the cost shifting from the hospital to the drugstore.

Recommendation

- CPDDS support community pharmacist roles and help save hospital costs.
- Consideration about community pharmacy compensation and practice guidelines are important for the project to succeed.

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