ACTIVITY-BASED COSTING OF THE PHARMACY DISPENSING SERVICE IN THE OUTPATIENT UNIT IN LADYAO HOSPITAL, NAKHONSAWAN PROVINCE, THAILAND

THIPPAWAN METHACANON

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Thippawan Methacanon

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ABSTRACT

This study was a cross-sectional study that analyzed the activity cost of the pharmacy dispensing service in the outpatient unit in Ladyao Hospital, Nakhonsawan Province, Thailand. Research used an activity-based approach in the fiscal year 2005. The research instruments were interviews and self-administered questionnaires. Cost data were collected by using data recording forms.

The results revealed that there were 18 activities of the outpatient pharmacy dispensing service in Ladyao Hospital. The total cost was 12,223,331.27 Baht which was composed of recurrent costs (96.46%) and capital costs (3.54%). The largest proportion of recurrent cost was cost of drugs and medical supplies. The third highest total cost activities were dispensing, followed by receiving the prescriptions/ printing drug labels, and billing. Unit cost of dispensing service was 85.85 Baht/ prescription or 19.10 Baht/ drug item. If the cost of drugs and medical supplies was excluded, unit cost was 11.76 Baht/ prescription or 2.62 Baht/ drug item. Unit costs of other services in the outpatient pharmacy dispensing service such as counseling, Adverse Event Reaction (AER), billing, and medication error were analyzed in this study. These results serve administrators for cost control and process improvement. In addition, results can be generalized to other services of the hospital.

KEY WORDS: ACTIVITY-BASED COSTING / PHARMACY / DISPENSING / OUTPATIENT UNIT

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ต้นทุนกิจกรรมงานจ่ายยาผู้ป่วยนอก ฝ่ายเภสัชกรรม โรงพยาบาลลาดยาว จังหวัดนครสวรรค์ (ACTIVITY-BASED COSTING OF THE PHARMACY DISPENSING SERVICE IN THE OUTPATIENT UNIT IN LADYAO HOSPITAL, NAKHONSAWAN PROVINCE, THAILAND)

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บทคัดย่อ

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อวิเคราะห์ต้นทุนกิจกรรมงานจ่ายยาผู้ป่วยนอก โรงพยาบาลลาดยาว จังหวัดนครสวรรค์ ในปีงบประมาณ 2548 โดยใช้แนวคิดการวิเคราะห์ต้นทุนกิจกรรม การศึกษานี้เป็นการศึกษาเชิงพรรณนา เก็บรวบรวมข้อมูลแบบไปข้างหน้าโดยใช้แบบสอบถามและการสัมภาษณ์ในเดือนกุมภาพันธ์ 2549 และเก็บรวบรวมข้อมูลต้นทุนย้อนหลังในปีงบประมาณ 2548 จากแบบเก็บรวบรวมข้อมูล

ผลการศึกษาพบว่างานจ่ายยาผู้ป่วยนอก ฝ่ายเภสัชกรรม โรงพยาบาลลาดยาวมีกิจกรรมทั้งสิ้น 18 กิจกรรม ต้นทุนรวมเท่ากับ 12,223,331.27 บาท คิดเป็นต้นทุนค่าดำเนินการ 96.46% และต้นทุนค่าลงทุน 3.54% สัดส่วนที่สูงของต้นทุนค่าดำเนินการเกิดจากต้นทุนค่ายาและเวชภัณฑ์ไม่ใช่ยา เมื่อจำแนกตามกิจกรรม พบว่า กิจกรรมที่มีต้นทุนรวมสูง 3 อันดับแรกได้แก่ กิจกรรมจ่ายยา, กิจกรรมรับใบสั่งยา/พิมพ์ฉลาก และกิจกรรมเก็บเงิน ต้นทุนต่อหน่วยของงานจ่ายยาผู้ป่วยนอก เท่ากับ 85.85 บาท/ ใบสั่งยา หรือ 19.10 บาท/ รายการยา ถ้าไม่รวมค่ายาและเวชภัณฑ์ไม่ใช่ยาต้นทุนต่อหน่วยจะเท่ากับ 11.76 บาท/ ใบสั่งยา 2.62 บาท/ รายการยา นอกจากนี้แล้วบริการอื่น ๆ ในงานจ่ายยาผู้ป่วยนอกยังถูกนำมาวิเคราะห์ต้นทุนด้วย ได้แก่ การให้คำแนะนำปรึกษาด้านการใช้ยา, การเฝ้าระวังเหตุการณ์ไม่พึงประสงค์จากการใช้ยาและผลิตภัณฑ์สุขภาพ, กิจกรรมเก็บเงิน และการเกิดความคลาดเคลื่อนทางยา ข้อมูลเหล่านี้จะช่วยให้ผู้บริหารสามารถควบคุมต้นทุน และพัฒนากระบวนการปฏิบัติงานได้ อีกทั้งสามารถนำไปประยุกต์ใช้กับงานบริการอื่น ๆ ของโรงพยาบาลต่อไป

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CHAPTER I
INTRODUCTION

1.1 Rationale and Justification of Study

Pharmacy works closely with other healthcare professionals to meet needs of the public, nowadays the various societal needs for pharmacy service require that the quality at a significantly limited resource. The hospital administrators must concern the efficiency and effectiveness of process. Since 1997, the resources and budgets have been limited because the severe economic crisis on impacted every organization. Thai governmental organizations and bureaucrats, as important mechanisms to run a state, must be reformed to prevent scarcity of resource. Thus, the government's policy to solve this problem is a new public administration, called Result-based management: RBM. One of the RBM is a reformed budgeting and material system program. Nowadays, the budgeting is reformed to the Strategic Performance Based Budgeting (SPBB). SPBB is a budgeting system to emphasize on systemic management of mission, goal, objective, strategy, program/ project of the organization and regular evaluation. This system can display the relationship of resource management and result or mission of organization under good governance. The SPBB approach is composed of three principles. One principle is devolution to flexible budgetary management. From this principle, 7 hurdles which cover all processes of budgeting are proposed for prevention of using money in a wrong way. The 2nd hurdle of 7 hurdles is output costing which is one of significant factors to allocate the budgets and could be an important efficiency indicator. In addition, cost information is more useful in indicating the size of funds likely to be required to continue programmes, assessing the use of personnel and the efficiency of putting supplies, transportation resources, and other inputs to work (Creese, A., & Parker, D., 2000: 1). Therefore, output costing calculation is an important for every SPBB administration to increase efficiency and to improve output quality of the organization in the future.

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Activity-Based Costing: ABC is an advised costing technique which use the cost information for activity management by integrated activities which the administrators can understand overall processes of their services related to performance indicators of organization and associated with each activity to further continuous process improvement (Tummanon, W., 2001: 12).

Ladyao Hospital is a 60-beded community hospital, located in Nakhonsawan Province. It serves 179,967 populations who are living in Ladyao district and some area of Maiwong district. In 2005, an average number of outpatient visits was 436 visits per day and total inpatient cased was 9,166 cases per year with length of stay was equal to 2.66 days per case. Vision of the hospital is to maintain quality of care for Hospital Accreditation, the pharmacy department also follows the hospital's vision to reach the hospital accreditation by providing more efficiency and effectiveness and more increasing on a pharmacist's role to perform pharmaceutical care and to improve continuous quality of service. To achieve the goal, the administrators mainly focused on development of the pharmaceutical service. The pharmaceutical service is one of the pharmacy department's jobs, which serves the outpatient and inpatient of Ladyao Hospital. The pharmaceutical service is classified into 4 parts as: dispensing service, counseling service, Adverse Event Reaction (AER) service, and drug information service. The job of dispensing service was to provide drugs to patients and to allocate to other departments of Ladyao Hospital. It is divided into 2 units; outpatient and inpatient units. The dispensing service in outpatient unit is a front line service of the pharmacy department to play a main role of the pharmacy department. However, a new direction of performance is emphasizing on service quality but due to the limited resources resulted in increasing of workload. This is exemplified by a number of prescriptions in outpatient unit in FY 2005 was equal to 137,046 prescriptions, with 37.71% increasing during 3 fiscal years and inpatient in FY 2004was equal to 25,176 prescriptions, with 162.74% increasing from the FY 2003, This information clearly shows an increasing of tasks and cost. The increasing of cost results from an attempt on job improvement to reach hospital's vision and the department's standard. It is imperative that the administrators play a vital role in both cost management and service quality improvement.

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From 2nd hurdle of SPBB and quality of service in scarcity environment are the important issues, it is essential for the hospital to use its' existing resources more efficiency and effectiveness through improving the management of hospital operation. The hospital costs and unit cost can serve as baseline information for hospital financial management, whereas the pharmacy dispensing unit of Ladyao Hospital doesn't have any prior cost information. Activity-Based costing (ABC) becomes as an alternative method for the executives to efficiently plan for resource allocation to reduce or eliminate of non-value activities. Therefore, this research applies ABC for cost analysis of the pharmacy dispensing service in outpatient unit. The fruitful findings from this research are used as a guideline for financial and service quality improvement aspects of the pharmacy dispensing service. The guideline also helps the executives in selecting the suitable activities, and decreasing cost corresponding an economic approach in using the limited resources effectively. Eventually, all results including this technique is not only adapted to other health services in Ladyao Hospital but also expandly used in other hospitals as well.

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1.2 Research Questions

1. What were the activities of pharmacy dispensing service in outpatient unit at Ladyao Hospital? And how long did it take for each activity?
2. What were the outputs of each activity and how much of these?
3. How did each activity distribute its' resources in terms of capital cost and recurrent cost?
4. How much was the unit cost of each activity?

1.3 Research Objectives

1. General Objective

To analyze activity-based costs of the pharmacy dispensing service in outpatient unit of Ladyao Hospital, Nakhonsawan Province during the fiscal year 2005.

2. Specific Objectives

1. To document an activity dictionary of pharmacy dispensing in outpatient unit in Ladyao Hospital.
2. To measure output of each activity of pharmacy dispensing in outpatient unit of Ladyao Hospital.
3. To calculate total cost, recurrent cost, and capital cost of pharmacy dispensing in outpatient unit of Ladyao Hospital.
4. To calculate the unit cost of each activity of pharmacy dispensing in outpatient unit of Ladyao Hospital.

1.4 Scope of the Study

In this study, ABC was applied to analyze costs of pharmacy dispensing service in outpatient unit in Ladyao Hospital during the fiscal year 2005 (October 2004-September 2005).

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1.5 Basic Assumptions

1. The activity-based costs were calculated from the actual expenditure of Ladyao Hospital.

2. All costs were collected during the fiscal year 2005 (October 1st, 2004 – September 30th, 2005).

3. Capital cost were not calculated opportunity cost of land. Depreciation cost of building and equipments were calculated by using straight line method.

1.6 Operational Definitions

1. Pharmacy dispensing service in outpatient unit means a work related in taking medicine to the patient whom treated at outpatient unit of Ladyao Hospital. The service includes Dispensing service, Counseling and Adverse Event Reaction (AER) service.

2. Activity pools mean the preparation, drug withdrawing, dispensing, counseling, providing Adverse Event Reaction (AER) service, detection medication error and reporting of the pharmacy dispensing service in outpatient, Ladyao Hospital.

3. Cost means an amount of money that Ladyao Hospital pays to perform pharmacy dispensing service in outpatient unit. It was classified as capital cost and recurrent cost.

4. Capital cost (CC) means the depreciation cost of outpatient building and equipments used in the pharmacy department that have life span of more than one year and price is equal or more than US$100. These costs were also the human investment capital cost.

5. Depreciation cost of building means the value of outpatient building, which was decreased by useful life. If a building is older than 20 years or is donated, the price is calculated as only 1 Baht.

6. Depreciation cost of equipment means the value of equipments in pharmacy department, which was decreased by useful life. If equipment is older than 5 years or is donated, the price is calculated as only 1 Baht.

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7. Human investment capital cost means the outlay of hospital to pay for training or education of personnel that occur rarely.

8. Recurrent cost means the sum of labor cost, material cost, and other cost.

9. Labor cost (LC) means salary, wage, position allowance, added benefit, medical fee, child school fee, overtime payment, short training or seminar of outpatient pharmacy dispensing service personnel in Ladyao Hospital during the FY 2005.

10. Material cost (MC) means the office and household supply cost, cost of drugs and medical supplies in pharmacy dispensing service in outpatient unit, Ladyao Hospital during FY 2005.

11. Other costs are calculated by the sum the cost of utilities (water supply and electricity) and maintenance/ repairing of equipments in pharmacy dispensing service in outpatient unit, Ladyao Hospital during the FY 2005.

12. Preparation activity pool is composed of 4 activities: 1) pre-packing the pill and preparation of the foiled drug activity, 2) preparation of equipments and place activity 3) arrangement of service time table activity, and 4) preparation of the compounded drug.

13. Drug withdrawing activity pool is composed of 2 activities: 1) the checking and withdrawing drug from the main stock activity, and 2) arrangement of drug stock activity.

14. Dispensing activity pool is composed of 5 activities: 1) receiving prescription and printing the drug label activity, 2) arrangement of drug dispensing activity, 3) checking drug activity, and 4) billing activity.

15. Counseling activity pool means the problem identification and provides counseling activity.

16. Adverse Event Reaction (AER) activity pool means an activity to become aware of and resolve AER.

17. Medication error activity pool means an activity to become aware of and resolve medication error.

18. Reporting activity pool is composed of 4 reporting activities: 1) the prescription reporting activity, 2) counseling reporting activity, 3) AER reporting activity, and 4) medication reporting activity.

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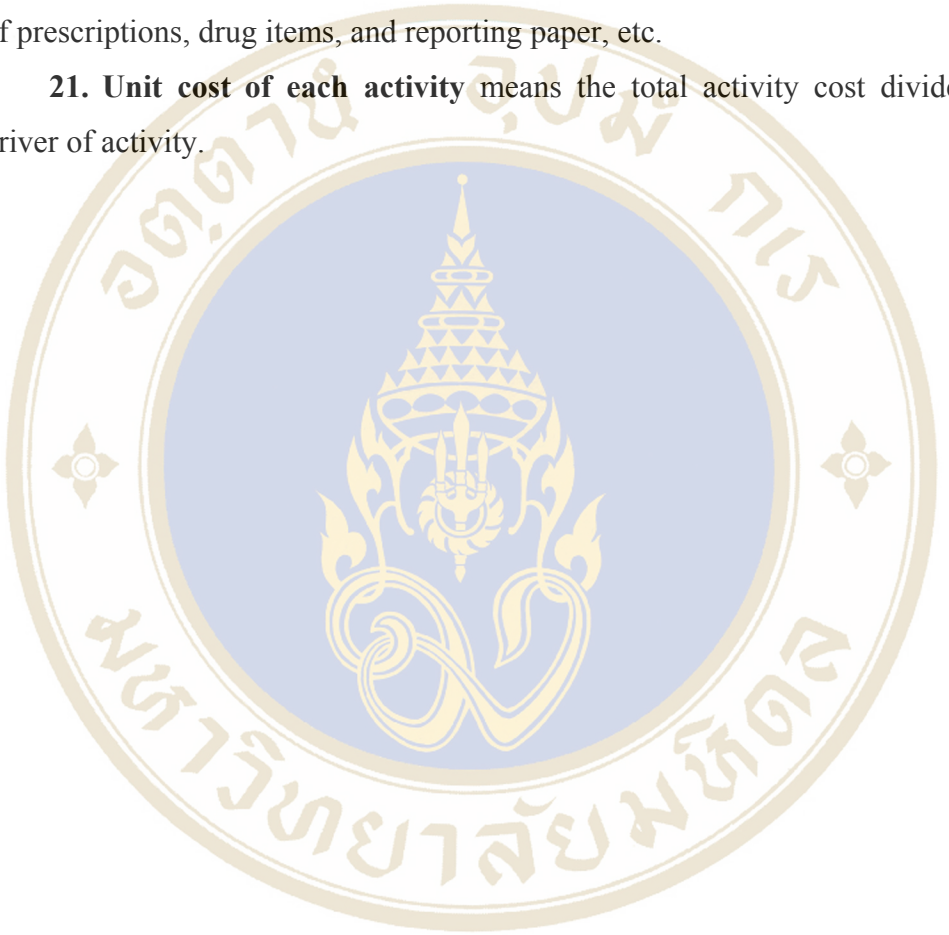
19. Total activity cost means the sum of capital cost and recurrent cost of each activity in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005.

20. Cost driver means the outputs in each activity of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005; for example, the number of prescriptions, drug items, and reporting paper, etc.

21. Unit cost of each activity means the total activity cost divided by cost driver of activity.



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1.7 Conceptual Framework

This research work was planned to analyze the unit cost of each activity in pharmacy dispensing service in outpatient unit as the following conceptual framework.

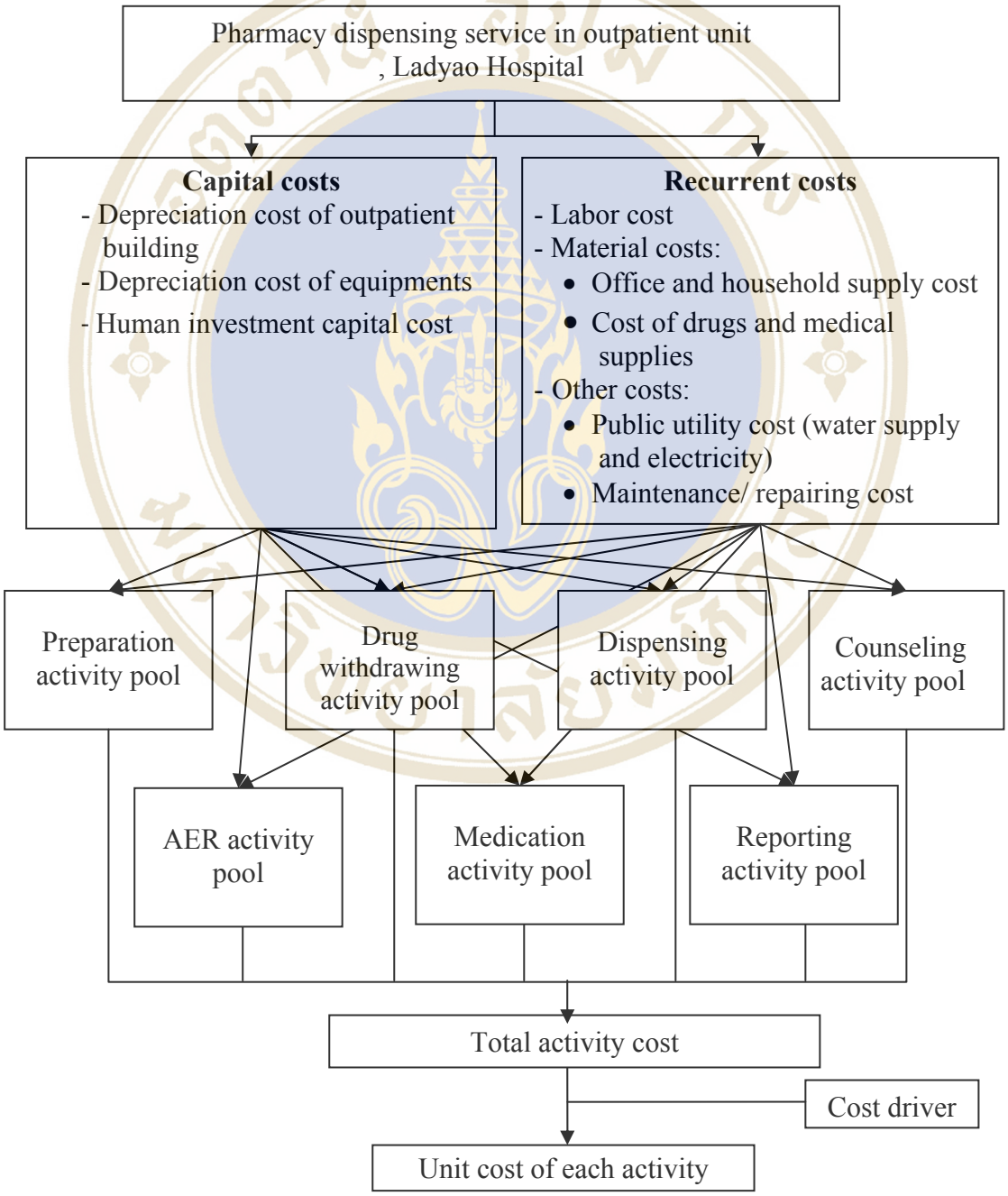

Figure 1 Conceptual Framework

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CHAPTER II
LITERATURE REVIEW

The study was about Activity-based costing (ABC) of Pharmacy dispensing service in outpatient unit in Ladyao Hospital. The literature review had covered ideas, theoretical information and related researches which were divided into 5 parts as follows:

2.1 Cost and cost theory
  2.1.1 Definition of cost
  2.1.2 Cost classification
2.2 Activity-based costing
  2.2.1 Definition of activity cost
  2.2.2 Activity and Traditional cost accounting contrasted
  2.2.3 The importance of Activity-based cost analysis
  2.2.4 Step of activity cost analysis
2.3 The organizational structure of the community hospital
2.4 Pharmaceutical service in hospital
2.5 Relevant researches

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2.1 Cost and cost theory

The hospital administrations realize that cost information is needed for good administration to make decision for planning, budgeting, controlling and assessing the organizational performance. Pannarunothai, S. (2001: 67) said that the study of cost is the measurement of resources which consumed in producing goods and services. The several benefits of cost for example used expenditure statement, evaluated priority of activities, evaluated efficiency and equity, health investment prediction, and financial planning, etc.

2.2.1 Definition of cost

Jacobs, P. & Rapoport, J. (2002: 44) defined that cost is the money outlay or expenditure that has been paid to the providers for their service.

Kamonratanakul, P. (2000: 21) and Supachutikul, A. et al. (1996: 3) similarly revealed that cost is the value of resources which were used as currency and non currency for the final products or outputs.

Creese, A. & Parker, D. (1994, 2000: 5) defined that cost as the value of resources used to produce something, including a specific health service or a set of services (as in a program).

Tangcharoensathien, V., et al. (1988: 8) defined that cost is the expenditure which currency and non currency.

Kaewsonti, S. & Kamolratanakul, P. (1991: 139-140) said that on the one hand, accounting cost is the real money expenditure and visible items. On the other hand, economic cost is the resources which were used as currency and non currency including the negative the negative consequence which was unexpected expense and invisible but estimated in term of opportunity cost. Creese, A. & Parker, D. (1994: 54) explained cost in view of economy is more than expenses for resources because some resources can be obtained with least or without cost such as donated medical supplies, volunteers, etc. If resources are used for one activity it may not be used in others such as the work of health volunteers.

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Treedej, P. (1997: 65) pointed that cost meant the amount of money or expense which the producers of goods or services must be paid in order to get factors, materials or services to use in goods producing or services.

Riwpaiboon, A. (2001: 2) described cost as losing resources may be the value of benefit or the value of money for obtaining something needed. (The value of resource is used in producing process).

In this study, the definition of cost is in the view of accounting cost that the amount of money that Ladyao Hospital must pay to perform pharmacy dispensing service in outpatient unit.

2.1.2 Cost classification

Supachutikul, A., et al. (1996: 1) described that the view of cost analysis is divided into three perspectives; provider, customer and social perspective. Creese, A. & Parker, D. (1994: 5-9) and Supachutikul, A., et al. (1996: 1-9) similarly explained that the component of cost is classified on several methods, particularly, the good classification conform with situation or objective of using which need three requisites: the first, it must be relevant to the particular situation; second, must not overlap with all costs; and the last, chosen must cover all possibilities. They proposed 6 types of cost classification as follows:

1. Classification by input is the most basis which divides cost into two groups are composed of:

1.1 Capital cost. It is the investment with a sum of money and a fixed cost as well, such as building cost, land and construct. The calculation of capital cost includes depreciated cost.

1.2 Operating cost, recurrent cost or running cost. It is the cost for manufacturing and services. The varied cost, such as salary, wage, overtime payment, material, utility and fuel are included in this kind of cost.

2. Classification for objective of public health analyzing project and it was classified following aspects.

2.1 Classified on activity, for example training, supervising, administrative management, following up and evaluation, etc.

2.2 Classified on used level such as nation, border, province and district.

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2.3 Classified on resource such as Ministry of Public Health, other ministry, rural government and organization of foreign.

3. Classification for analyzed production and financial report.

3.1 Direct cost and indirect cost

3.1.1 Direct cost was material cost and labor cost as related to production or direct service which able to specific that which was product and service. This cost reached full when it was cancelled.

3.1.2 Indirect cost was cost which did not specific that what was product or service such as public utility, depreciation, office rental or material.

3.2 Product cost and period expense

3.2.1 Product cost was cost related products and able products. This cost is comprised with direct material cost, direct labor cost and overhead cost.

3.2.2 Period expense was expense which unable to specific and was reported that was period expense in that time such as selling promoted value, expense in management.

4. Classification of cost for cost control

4.1 Traceable cost and non traceable cost. Traceable cost is cost as clearly specify that what dose it relate. Non traceable cost is cost as no identify that what dose it relate and has to distributing to several center, for example quantity of production, area, number of professional and responsibility unit, etc.

4.2 Controllable cost and non controllable cost

4.3 Fixed cost and variable cost. Fixed cost is no changed total cost when activity level or quantity of service is changed but variable cost is changed, e.g. medical supply for patients, etc.

5. Cost classification for planning is the process of estimation and income analysis, expenditure and profit these are budgeting

6. Cost classification for alternative decision-making.

6.1 Differential cost, in case of various options as consider on some similar cost hence, administrator is able to compare some unlike cost which effect to various analysis is decreased.

6.2 Sunk cost was cost of previous decision and unable to change. Hence, sunk cost would be similarly value and unnecessary to consideration such as

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purchased instrument this was also cost although those were closed and that instrument was no used go on but depreciation cost was also considered.

6.3 Opportunity cost. Economists pointed that if resources are used for one activity it may not be used in other choices. Economic cost analysis does not subsidize the accounting cost but added information to make administration's decision for comparing the appropriately and equity choices.

In summary in this study, the researcher scopes to analyze cost in view of provider perspective and classified cost by input which divided into 2 groups: capital cost and operating cost.

2.2 Activity-based costing

Activity-Based Costing or ABC was proposed by Kaplan and Cooper in 1988, the first printed in the journal of cost management and Harvard business review. After that, this system was accepted and rapid popularity in England and Europe. At the first in Thailand, the private businesses interested and adopted ABC for their organization. At the present, ABC was expandly used in other organizations (Tummanon, W., 2001: 22). For the health care system, there is a need for ABC because competition in health care is a driving force while productivity and efficiency remain serious concerns. ABC can deliver the information to maximize resources and to relate costs to performance and outcome measure. Management decision makers can utilize ABC information to accomplish cost efficiency without negatively impacting the quality of service delivery while also assisting in continuous quality improvement (Baker, J. 1998: 2). ABC has been successfully applied in health care to reduce overall treatment costs (Carr, 1993; Candy, 1995; Caltrider, Pattison, and Richardson, 1995 cited by Devine, K., O'clock, P. & Lyons, D., 2000: 186).

2.2.1 Definition of activity cost

Tummanon, W. (2001: 12) described that activity cost is the value of resources which used to perform activities of enterprise. It composed of labor, material, machine, vehicle, computer system, and others. Activity–based is the administrated system to use the cost information for activity management by integrated activities.

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The administrators can understand overall processes of their services and associate of each activity for further continuous process improvement.

Charaemmeprasert, C. (2001: 22) explained that ABC is the cost management, which can help the administrators to understand the cost behavior in their organization. This system emphasize on activity management by divided organizational processes into activities. This system help the administrators to know what dose the activities of process, how much the time spent on each activity, and how many the output of activity performed. Therefore, the basic steps of activity accounting system were compose of: 1) activity identification, 2) activity cost analysis, and 3) performance measurement on time and quality aspects.

Activity accounting is the collection of financial and operational performance information about significant activities of an enterprise. (Brimson, J. A., 1997: 203)

In this study, Activity-based costing was the moneytary value of resources which used in each activity of outpatient pharmacy dispensing service in Ladyao Hospital. These activities were composed of the processes from receiving the prescription, drug arrangement, checking activity until dispensing activity and also the processes of the preparation, outpatient counseling, AER, and reporting activity.

2.2.2 Activity and Traditional cost accounting contrasted

The traditional view of cost accounting is that services or products consume resources. The activity-based costing view is that services or products consume activities, and then activities consume resources (Figure 2).

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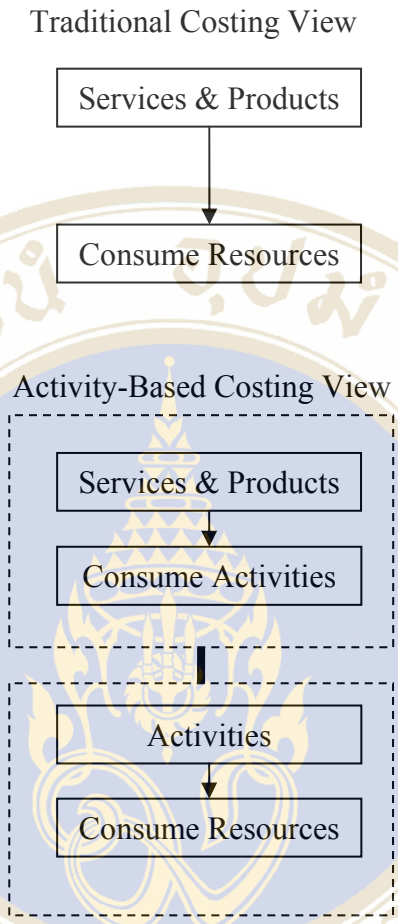

Figure 2 Two views of costing: Traditional vs. ABC

Source: Baker J. J., Activity-based costing and activity-based management for health care, 1998. p. 3

The comparison of traditional and ABC allocation are same composed of 2 steps but the different are including: (Figure 3)

1. The first step, cost element or resources are assigned to activity cost pools not to cost pools as the traditional accounting. The allocation criteria in this step is called resource driver.

2. The second step, activity costs are assigned to product or output by using cost per driver rate criteria. Contrastively, the allocation criteria of the traditional accounting which related to the quantity of production that may distort cost because some goods or services cost does not only depend on quantity of production.

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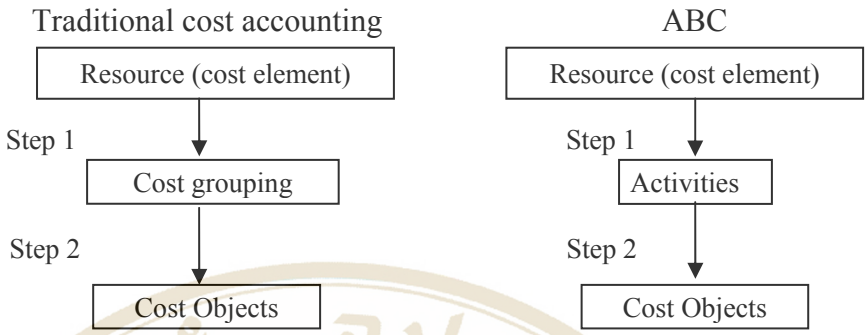

Figure 3 The comparison of traditional cost accounting and ABC
Source: Tummanon, W., Activity based costing: ABC, 2001. pp. 24-25

These differences in an approach, cost determination, and allocation criteria between ABC and the traditional accounting were concluded in Table 1.

Table 1 The comparison of traditional accounting and ABC

Items	Traditional accounting	ABC
1. Cause of cost	Product and quantity of production	Activity
2. Cost assignment	Assign cost to enterprise or department accounting	Assign cost to activity which vary to cost driver
3. Cost allocation criteria	Using criteria which related to the quantity of production	Cost driver of each activity
4. Cost identification	Identify cost according to quantity of production in that period	Identify cost according to activity levels such as 1) unit 2) batch 3) product sustaining, and 4) facility level
5. Cost determination	Determine one thing such as goods or service	Determine many things, e.g. unit of production, group of production, and customer, etc.

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Table 1 The comparison of traditional accounting and ABC (continued)

Items	Traditional accounting	ABC
6. Activity relationship in the organization	Does not take data to understand the relationship of activities	Take data to understand the relationship of activities
7. Cost information for making decision	Because of not appropriate allocation criteria result to distort cost	More actual cost because the allocation criteria support cost driver
8. Cost controlling	Emphasize on department or operation control by standard of work and different analysis of operation in each department more than cross functional	Emphasize on activity determination to reduce or eliminate non-value added activity. Clearly information of cost cause and how to manage them
9. Performance indicator	Financial indicator	Cost, quality, time, and flexible of activity to continue improvement
10. Time and expenditure	Less time spent and expenditure to implement and maintenance	More time spent and expenditure to implement and maintenance

Source: Bureau of the budget Thailand and department of accountancy faculty of commerce and accountancy, Chulalongkorn University, 2000. pp. 4-13, Tummanon, W., 2001. pp. 4-11

2.2.3 The importance of Activity-based cost analysis

One of the most important recent innovation in cost analysis has been the development of activity-based costing; ABC (Baker, 1998; Chan, 1993 cited by Mclean, R. A., 2003: 136). It has helped to identify the costs of particular services better than was previously possible, and has been a valuable tool in the performance

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evaluation approach known as the Balanced Scorecard (Kaplan and Norton, 1992 cited by Mclean, R. A., 2003: 136).

Brimson, J. A. (1997: 23-24) said that Activity accounting helps a company to achieve enterprise excellence by:

1. Improving make/buy, estimating, and pricing decisions that are based on a product cost that mirrors the manufacturing process.
2. Facilitating elimination of waste by providing visibility of non-value added activities.
3. Identifying the source of cost by identifying the cost drivers.
4. Linking corporate strategy to operational decision making, thus enabling management to capitalize on activities that are a corporate strength while restructuring activities that do not contribute to achieving corporate objectives.
5. Providing feedback on whether the anticipated results of the strategies are obtained so that corrective action can be initiated.
6. Ensuring that time, quality, flexibility, and conformance to schedule goals are achieved by linking performance measures to strategy.
7. Encouraging continual improvement and total quality control because planning and control are directed at the process level.
8. Improving the effectiveness of budgeting by identifying the cost/ performance relationship of different service levels.
9. Improving profitability by monitoring total life-cycle cost and performance.
10. Providing insight into the fastest-growing and least visible element of cost-overhead.
11. Ensuring achievement of investment plans by monitoring the investment through the activity accounting system so that when deviations from plan are detected, corrective action can be initiated.
12. Continually evaluating the effectiveness of activities to identify potential investment opportunities.

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13. Incorporating externally set target performance and cost goals and setting of specific goals at the activity level.

14. Eliminating many crises by fixing the problems rather than treating symptoms.

It is also important to stress that the cost management system will do nothing but identify where potential problems are encountered. It is what people do with the information that will determine whether cost management is success.

Tummanon, W. (2001: 17-18) said that ABC helps the administrators to understand the relation of activities within their organization. This point is necessary because the processes of work in organization are occurred from output of one activity to be input of another activity. This relationship determines the real caused of cost.

2.2.4 Step of activity cost analysis

Brimson, J. A. (1997: 58-60) revealed the seven steps to computing activity cost are:

1. Activity analysis
2. Life-cycle classification
3. Determination of activity cost

3.1 Tracing of organizational resources to activities with an established causal relationship

3.2 Determination of the measure of activity by which the cost of a given activity varies most directly (as in number of purchase orders, number of hours of grinding, and so forth)

3.3 Calculation of cost per activity

4. Identification of performance measures
5. Determination of the cost of business processes
6. Tracing of cost to reporting objective
7. Calculation of product cost

Chareammepraserd, C. (2001: 2-4) demonstrated the steps of ABC follow as:

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1. Production or service determination
2. Activity analysis
3. Determined cost driver to cause of activity cost
4. Calculate direct cost and allocate indirect cost to activity by using activity driver
5. Associate activities in production or service and allocate activity cost to that production or service
6. Set short term and long term goals, and key critical success factors of organization
7. Manage and control activity which occurred in process of production or service and evaluate that activity effectiveness and efficiency.

Brimson, J. A. (1997: 11-12) said that the activity accounting approach to cost management breaks down an organization into activities. An activity describes what an enterprise does-the way time is spent and the outputs of the process. The principal function of an activity is to convert resources (materials, labor, and technology) into outputs. Activity accounting identifies activities performed in an organization and determines their cost and performance (time and quality). A simple and effective activity accounting system uses the following approach:

1. Determine enterprise activities.
2. Determine activity cost and performance. Performance is measured as the cost per output, time to perform the activity, and the quality of the output.
3. Determine the output of the activity. An activity measure (output) is the factor by which the cost of a process varies most directly.
4. Trace activity cost to cost objectives. Activity costs are traced to cost objectives such as products, processes, and orders based on the usage of the activity.
5. Determine corporate short-range and long-term goals (critical success factors). This requires an understanding of the current cost structure, which indicates how effectively operating activities deliver value to the customer.
6. Evaluate activity effectiveness and efficiency. Knowing the critical success factors (step 5) enables a company to examine what it is now doing (step 4) and the relationship of that action to achieving those goals. Everything a company does-or

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avoids doing-is measured against the short-and long-term goals. This provides a useful formula on which to base a decision of whether to continue performing or to restructure an activity. Also, cost control is improved by ascertaining if there are superior methods of performing an activity, identifying wasteful activities, and determining the cause of the cost.

Summary, there were 5 steps to analyze cost of outpatient pharmacy dispensing activities as follow:

1. Preparation

1.1 Study to apply ABC system to pharmacy service and plan to implement and analysis.

1.2 Allowed the permission document from faculty of graduate studies to the Ladyao Hospital.

1.3 Committee with relevant staff to clear the study objectives and processes of data collecting.

2. Activity dictionary creation

2.1 Organizational system analysis of Ladyao Hospital and Pharmacy department.

2.2 Activity analysis to identify activity and determine cost driver.

3. Data collecting
4. Data analysis.
5. Calculated unit cost of each activity.

2.3 The organizational structure of the community hospital

The preliminary knowledge about organizational structure is necessary to ABC analysis. The aim of this study was to analyze cost of outpatient pharmacy dispensing activities in community hospital, studied in Ladyao Hospital. So, organizational structure of community hospital and pharmaceutical service was the major factor to analyze.

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Toiradsa, S. (2003: 12) said that the community hospital was the 10, 30, 60, 90, and 120 beds hospital which establish in district, sub-district or large community to provide health care services.

Nowadays, internal units of the community hospital are divided into 3 clusters such as facility, service, and nursing cluster. Details of each cluster are presented in Figure 4.

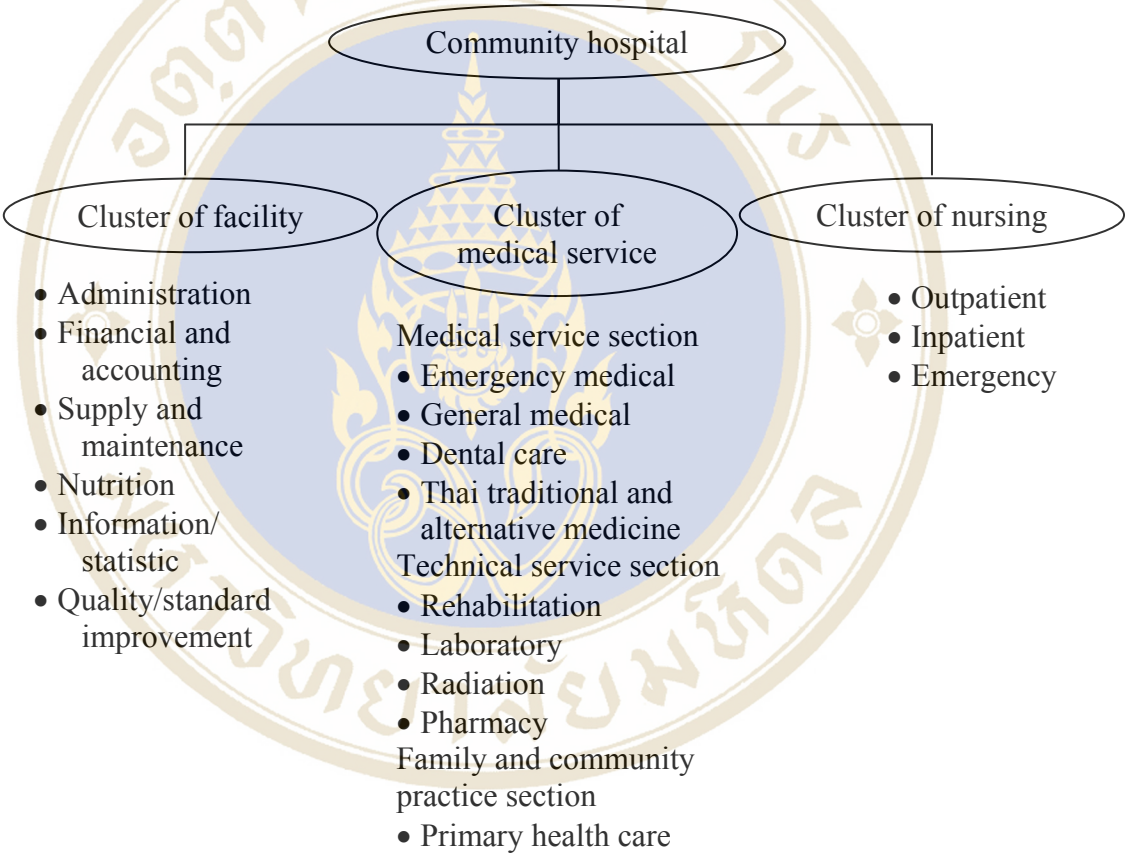

Figure 4 The organizational structure of the community hospital

Source: Office of permanent secretary in Ministry of Public Health and Office of the Civil Service Commission, http://www.moph.go.th/about/structure/

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Ladyao Hospital is a community hospital in Nakhonsawan Province that has 60 beds and serves 179,967 populations who live in Ladyao district, Maipern sub-district, Chumtabong sub-district and some area of Maiwong district. Organizational structure of Ladyao Hospital is presented in Figure 5.

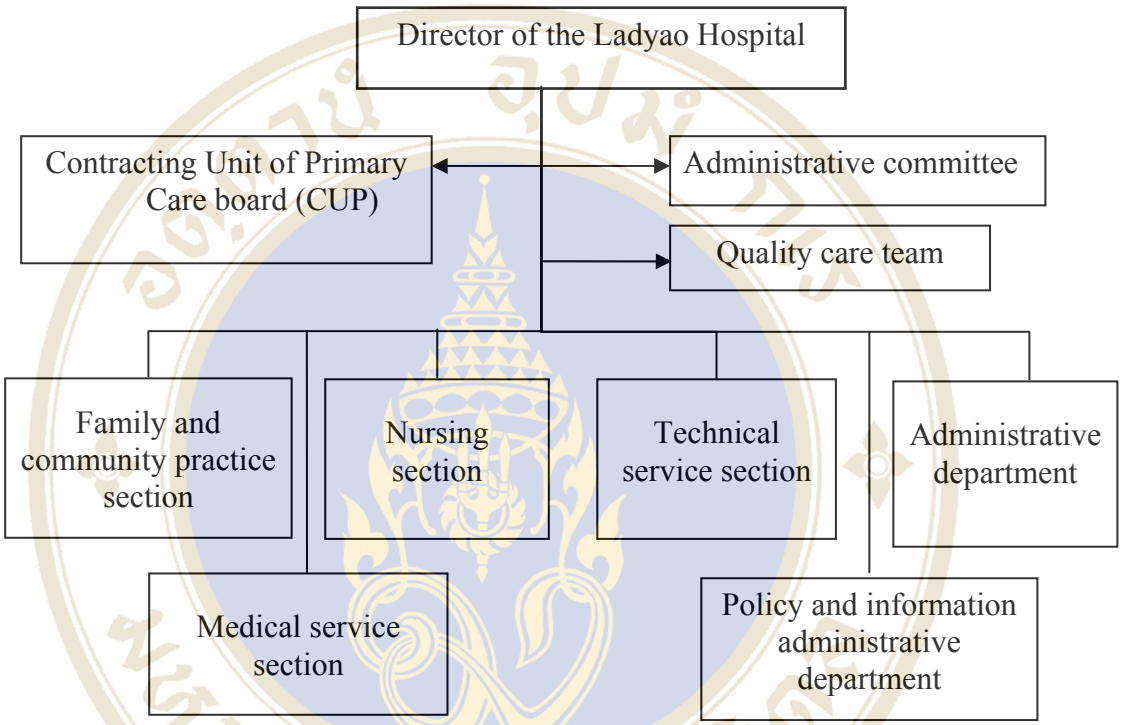

Figure 5 The organizational structure of Ladyao Hospital
Source: Ladyao Hospital, the annual report, 2004

Comparison Figure 4 and 5, almost Ladyao Hospital structure is similarly the structure of community hospital which determine by Public Health Ministry but Administrative department and the quality care team of Ladyao Hospital were separated from cluster of facility and added policy and information administrative department.

Pharmacy department is categorized into the technical service section. The structure of pharmacy department is presented as Figure 6.

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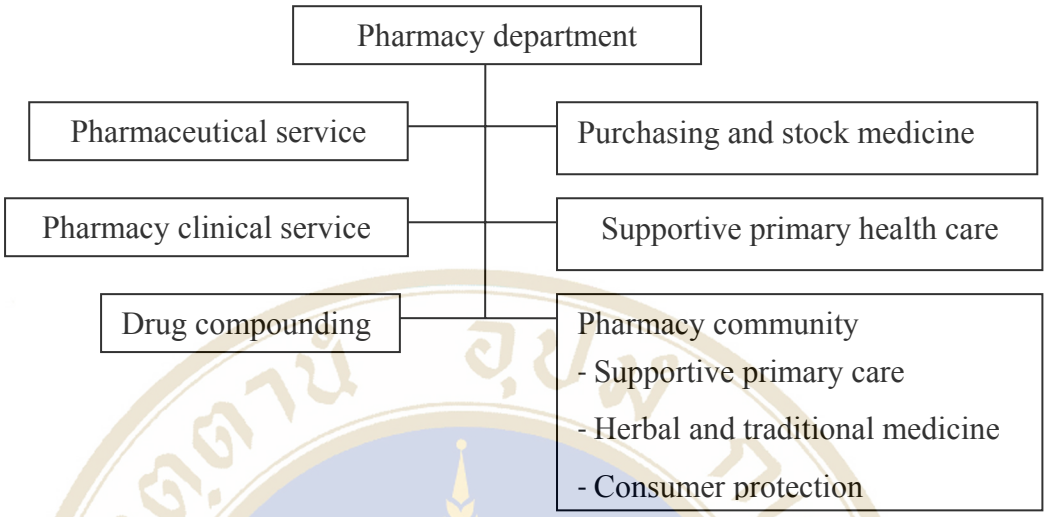

Figure 6 The organizational structure of the pharmacy department

Source: Office of permanent secretary in Ministry of Public Health. Community hospital manual, 1993. pp. 1-55

The organizational structure of the pharmacy department in Ladyao Hospital is presented in Figure 7.

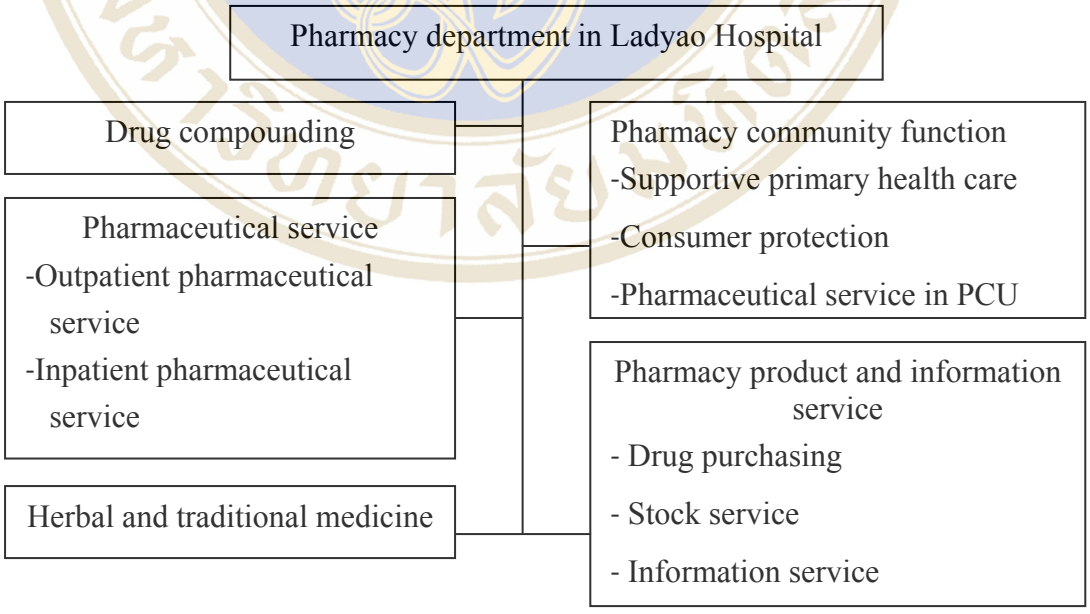

Figure 7 The organizational structure of Pharmacy department in Ladyao Hospital

Source: Ladyao Hospital, the annual report, 2004

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In Figure 6 and 7, the organizational structure of the pharmacy department in Ladyao Hospital is similarly the structure determination of Public Health Ministry, different in grouping and calling such as

1. Herbal and traditional medicine in Ladyao's Pharmacy department is separated from the pharmacy community function.

2. In Ladyao's pharmacy community function is added the pharmacy service in PCU.

3. Drug purchasing and stock service in Ladyao's Pharmacy department is grouped in the pharmacy product and information service.

4. Pharmacy clinical service is grouped in the pharmacy product and information service in Ladyao's pharmacy department.

In part of pharmaceutical service function, these services are divided into 2 tasks such as outpatient pharmaceutical service or outpatient pharmacy dispensing service and inpatient pharmaceutical service.

Target of Pharmacy department in Ladyao Hospital is the quality of service improvement by increasing effectiveness and efficiency of pharmacy service and expand pharmacist's role to pharmaceutical care, resulting in the patient receiving medicine accurately, safe and a faster service. Eventually, people have useful from best health care service.

2.4 Pharmaceutical services in the hospital

The scope of pharmaceutical services likely varied, depending upon the needs of the patients served. Therefore, we must determine the standard of services not only to guide in management and improvement the pharmaceutical service system to the international standard but also guide to assessment the scope and quality of pharmaceutical service in the hospital. There are six standards (The Pharmacy Council and the Association of Hospital Pharmacy (Thailand) , 2003: 134-141) follow as:

Standard I: Leadership and practice management. Effective leadership and practice management skills are necessary for continuous quality improvement and

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development the pharmaceutical service structure to support the organizational mission and based on the needs of patients served. The leader of the pharmacy shall be responsible for:

1. Setting the short- and long-term goals of the pharmacy based on the needs of the patients served, the specific needs of the hospital, and developments and trends in healthcare and hospital pharmacy practice.
2. Developing plans and schedules for achieving these goals.
3. Directing the implementation of the plans.
4. Determining whether the goals and schedule are being met.
5. Instituting corrective actions where necessary.

Standard II: Drug information services and drug education. The pharmacist shall provide patient-specific drug information and accurate information about drugs to other health professionals and patients. Up-to-date drug information shall be available, including current periodicals and recent editions of textbooks in service areas.

Standard III: Optimizing medication therapy. The most important aspect of pharmaceutical services is the optimizing medication use to ensure that medications are used appropriately, safety, efficiently and effectively. To achieve these goals, the pharmacy must perform follow as:

1. Medication-use policy development.
2. The pharmacopoeia system. Determining the criteria for selecting the quality drugs and routinely improve the pharmacopoeia to appropriately use. The procedure of drug items unless of the pharmacopoeia must be used to ensure the security.
3. All prescriptions (except in emergency situations) must be read and reviewed for appropriateness by pharmacist before the first dose is dispensed.
4. Medication-therapy monitoring for inpatients and outpatients.
5. Pharmacist consultations. The pharmacists should provide consultation to other health professionals regarding medication-therapy selection and management.
6. An ongoing medication-use evaluation.

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7. Development the pharmacy to pharmaceutical care services.
8. Controlling and promoting the appropriate selling drug in the hospital.

Standard IV: Medication distribution and control. The pharmacy shall be responsible for the procurement, distribution, and control of all drug products used in the hospital.

1. Medication orders. All patient medication orders shall be contained in the patient's medical record.
2. Dispensing. The pharmacist shall be responsible for checking the optimizing and accurately of all patient medication therapy before dispense and advice drug information to the patient.
3. Unit dose packaging. Whenever possible, medications shall be available for inpatient use in unit dose or single-unit packages and a ready to administer form.
4. Medication storage in ward and other department e.g. Emergency room, ICU. The pharmacist shall determine the items of drug used with the pharmaceutical therapeutic committee and medications must be stored under proper conditions.
5. Determining the clear and strict procedure to ensure control of the distribution and use of specific controlled substances and other medication with potential for abuse.
6. Extemporaneous compounding shall be prepared by appropriately trained personnel. All steps of these procedures must be adequate quality assurance by pharmacist.
7. Sterile products. All sterile medications shall be prepared by appropriately trained personnel. Quality assurance procedures for the preparation of sterile products shall exist.
8. Medication errors. The pharmacists, physicians and other health personnel shall establish policies and procedures to prevent the medication errors. Ongoing monitoring and review of medication errors should be maintained.

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9. Drug product recalls. A written procedure shall exist for the handing of a drug product recall. These should be an established process for removing from use any drugs or devices subjected to a recall.

10. Patient's own medications. Drugs and related devices brought into the hospital by patients shall be identified by pharmacist and documented in the patient's medical record if those medications are to be used during hospitalization.

11. Samples. The pharmacy must control these products by maintenance of records and monitoring its efficacy.

12. Cytotoxic and hazardous drug products. Policies and procedures for management those products are available.

13. Medication storage. All stocks shall be inspected at least one time yearly.

14. Disaster service. The pharmacist shall codetermine the medical emergency items and the procedure for providing pharmaceutical services in case of disaster.

15. The appropriate medication storage.

Standard V: Facilities and equipments. To ensure the optimal of quality and efficiency in operational performance, adequate space, equipments and supplies shall be available.

Standard VI: Research. The pharmacy should initiate, participate and support the research which appropriate to the goals and resources of the hospital.

Pharmaceutical service in Ladyao Hospital follows the standard of pharmaceutical services in the hospital especially the pharmacy dispensing service in 3rd and 4th standard. To ensure that medications are used appropriately, safety, efficiently and effectively, role of pharmacy dispensing service in outpatient unit in Ladyao Hospital are:

1. Dispensing and advising the appropriate patient-specific drug information.

2. Provide drug and health production consultation to other health professionals and patients.

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3. Monitoring drug and health production adverse reaction.
4. To monitor, evaluate and develop service system
5. Inventory drug controlling and provide appropriate stock in sub-stock.

Outputs of the pharmaceutical service in Ladyao Hospital are presented in Table 2.

Table 2 Outputs of the pharmaceutical service in Ladyao Hospital for the past 3 years ago

Items	FY			Average
	2002	2003	2004	
Outpatient pharmacy service				
- Prescription	100,985	109,414	127,939	112,780
- Drug Interaction (time)	82	50	38	57
- Medication error (time)	1,940	1,972	1,875	1,929
- Counseling (time)	245	153	137	178
- Adverse Event Reaction; AER (case)	18	51	38	36
Inpatient pharmacy service				
- Prescription	4,432	9,582	25,176	13,063
- Discharge counseling (time)	2,545	6,236	9,461	6,080
- Bed side counseling(time)	1,657	3,346	9,461	4,821

Source: Ladyao Hospital, the annual report of pharmacy department, 2004

Table 2 shows the yearly increasing prescription, the numbers of outpatient prescription in 2004 was 127,939 prescriptions, with increasing rate 26.69% during 3 years. The numbers of inpatient prescription in 2004 was 25,176 prescriptions, with increasing rate 162.74%, very large percentage of inpatient prescription result from the inpatient pharmacy service system changed from three-day dose to one-day dose service in December 2003.

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2.5 Relevant researches

Laorkeidtinan, P. studied in 2000 to analyze the unit cost of 6 health centers in Bangsoatong sub-district health public office, Samudprakan Province during fiscal year 1998. This study was the explanatory research and analyzed cost in provider perspective. The instruments were the collecting forms which according to the cost element; labor cost, material cost and capital cost. The direct distribution method was used for allocated indirect cost. The research was found that the highest unit cost were maternal and childhood health activity, treatment activity and school health activity (228.97 Baht, 149.83 Baht, 110.87 Baht, respectively). The cost of treatment activity, immunization activity, maternal and childhood health activity were 56.60%, 10.48%, 6.61% of total cost, respectively. The highest costs were material cost (51.15%), labor cost (33.55%) and capital cost (15.30%), respectively.

Taehan Kanho Hakhoe Chi studied in 2004 to analyze cost of home care in Korean with activity-based costing. The research was carried out by analizing the Hospital Home Care; HHC and collecting labor and operating expenses. For resource drivers, HHC activity performance time and workload were studied. For activity driver, the number of HHC activity performances and the activity number of visits were studied, which was found that the HHC activities were classified into 70 activities. In resource, the labor cost was 245 won/minute; operating cost was 9,570 won/visit and traffic expense was average of 12,750 won. Education and Training had the longest time of 67 minutes. Average length of performance for activities was 13.7 minutes. The average cost of HHC was 62,741 won (range 55,560-74,016 won)

Lazaro M., Lopez del Amo P., Escribano P., et al. studied to calculate the cost of heart transplant by applied Activity-Based Costing in 2004. To develop a method to calculate accurately heart transplant cost and to analyze comparatively the calculated costs and the variations in clinical practice and organizative-economic strategy among 4 spanish hospitals. The research a combining ABC methodology (critical activities) and market price (non-critical activities). The information collection was prospective and simultaneous to every patient transplant process. They found that mean of cost in

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4 studied hospitals was 39,975 euros. The global cost and the cost of each phases varies significant among hospitals. The differences were depended on variations in clinical practice and organizative strategic planning. They concluded that ABC method is applicable to accurately calculate the cost, detected inefficient activities and allowed to optimized costs in heart transplant process.

Sopanna, W. studied prevention and promotion (P&P) activities-based costing of primary care unit at salalumduan, Sakaeo Province, Thailand in 2004.This study was a cross-sectional study and three principles used in ABC were activity analysis, activity costing and performance measurement. The result showed that the P&P cost in FY 2003 was 1,186,497.59 Baht, the government funding of P&P capital cost was 927,740.93 Baht and labor cost was 636,681.59 Baht. The operating cost was 101,055.86 Baht and capital cost was 167,586.81 Baht. The non-UC budget was 22,416.67 Baht. The lowest unit cost was in the sanitation and environmental health services sub-activity.

Intaraprasong, B., Kongsin, S. & Sumirattana, W. studied cost analysis for production of graduate students at all levels, Faculty of Public Health, Mahidol University, Academic year 2001. This study was cross-sectional description research by activity approach. The result found that unit cost of production of graduate students at all levels was 114,257.40 Baht; 46% of labor cost, 29% of material cost, 21% of capital cost. The highest unit cost of Ph.D. was 421,961.77 Baht. Categorized by program, there were 72 students in Master of Public Health program which the unit cost was highest (317,191.73 Baht).

In 2003, Van Zanten, A., et al. studied the importance of nondrug costs intravenous antibiotic therapy by using activity-based approach. This study was performed in 605-bed secondary referral centre with 20 intensive care unit beds. The 103 routine activities of different methods of preparing and administering IV antibiotics were studied workload and costs. They found that the average time spent for 4 methods: administration by volumetric pump, administration by syringe pump, administration by unaided infusion bag, and administration by direct IV injection were 4: 49±2: 37, 4: 56±2: 03, 5: 51±3: 33 and 9: 21±2: 16 minute (mean minutes: seconds standard deviation) respectively. The average cost of time spent by relevant staff and material costs were €5.65, €7.28, €5.36 and €3.83 respectively. They

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concluded that the costs of IV antibiotic administration not only compose of costs of drug but also other factors. These factors were considered by the physicians whom use IV antibiotics in intensive care unit.

For unit cost study in pharmacy, there are 2 studies at Chonburi Hospital and Sena Hospital which the activities of pharmacy were difference, in Chonburi Hospital, the pharmacy dispensing services were dispensing, compounding, and inventory management. These services were the traditional main function of hospital pharmacy in Thailand. The new roles of pharmacist have changed toward patient oriented practice. Then pharmaceutical services are not only for dispensing, compounding, and inventory management but also pharmaceutical cares. The pharmaceutical cares are counseling, drug information service, drug utilization review, and other clinical service for patients. Hence, scope of cost analysis in Sena Hospital was similarly in this study more than in Chonburi. The details of their studies were revealed follow as:

Chetchotisakd, P. studied the unit cost of Pharmacy department, Chonburi Hospital, Fiscal year 1991. This study is the retrospective to analyze total cost, unit cost and activity cost of Pharmacy department. The especially results of pharmacy dispensing service in outpatient unit found that it had 29 staff and 179,755 prescriptions or 378,132 items during fiscal year 1991. Total cost of pharmacy dispensing service in outpatient unit was 19,372,723.75 Baht which the highest was material cost, followed by operating cost and capital cost respectively. The medicine cost was the highest proportion of material cost (99.30%) and labor cost was the highest proportion of operating cost (97.28%). The activity cost was 115.27 Baht/ prescription or 15.41 Baht /prescription if not included the medicine cost. This study revealed data that can be utilized for management and set up for appropriate pharmaceutical prices, budget planning and proper evaluation in department of pharmacy.

Thadtapong, K. studied unit cost of pharmacy services at Sena Hospital during FY 1997. This study was conducted simultaneous equation method to allocate indirect cost. Total direct cost was 24,460,119.20 Baht which 83.45% for material cost, 14.04% for labor cost and 2.51% for capital cost. Cost of providing outpatient pharmaceutical care was 609.49 Baht per service. In outpatient dispensing service, the cost per prescription was 126.61 Baht and 41.05 Baht per drug item. Operating cost,

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which calculated by subtracting from total cost, the acquisition costs of drug and medical supplies and cost of drug compounding. For outpatient dispensing was 19.40 Baht per prescription and 6.31 Baht per drug item.

From review literature above, the researcher used the approaches in relevant studies and theories to guide in applied activity-based costing methodology of pharmacy dispensing service in outpatient unit, Ladyao Hospital as details in chapter 3.

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CHAPTER III
RESEARCH METHODOLOGY

3.1 Research Design

This study was a cross-sectional study to analyze activity-based costs of pharmacy dispensing service in outpatient unit based on a provider perspective. The secondary data were retrospectively collected during the FY 2005 (from October 1, 2004 to September 30, 2005). In addition, the primary data were also prospectively collected in February 2006.

3.2 Study Site

The pharmacy dispensing service in outpatient unit, the pharmacy department in Ladyao Hospital, Nakhonsawan Province was the study site.

3.3 Research Instruments

The research instruments in this study classified by the types of data were composed of:

1. Primary data recording forms

1.1 Open-ended questions. This form was a guideline of questions for interviewing the outpatient pharmacy dispensing service chief about the process of work, activity, user, input, and output identification of each activity.

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1.2 C1: Activity dictionary (see appendix, p. 100). These forms were the self-administrated questionnaires which were used to collect the data on activity identification and working time spent.

2. Secondary data recording forms. These instruments were the recording forms to obtain information on financial records classified by cost items as:

2.1 Capital costs were composed of:

2.1.1 C2: Depreciation cost of building recording form (see appendix, p. 106). This form was consisted of construction year of the building, construction cost, space of building, proportion of pharmacy department area.

2.1.2 C3: Depreciation cost of equipment recording form (see appendix, p. 107). This form was consisted of equipment items, cost, quantity, and purchasing year of the equipment used in pharmacy department.

2.2. Recurrent costs were composed of:

2.2.1 Recording forms on labor cost were categorized into 3 forms including:

- C4.1: Recording form on labor cost (see appendix, p. 108) was consisted of salaries, wages, overtime payment, position allowance, added benefit, medical fee, training/ seminar payment, and other benefits.

- C4.2: Recording form on working time allocation (see appendix, p. 109). This form was collected working time both workday and weekend spent of each staff during the FY 2005.

- C4.3: Recording form on proportional of time spent (see appendix, p. 110). This form was collected working time on outpatient pharmacy dispensing service of each staff from service time tables.

2.2.2 Material cost recording forms were categorized into 2 forms including:

- C5: Recording form on cost of drugs and medical supplies (see appendix, p. 111). This form was consisted of items, quantity, and cost of drug and medical supplies in outpatient pharmacy dispensing service.

- C6: Recording form on cost of office and household (see appendix, p. 119). This form was consisted of items, quantity, and cost of official and household material used of each activity in outpatient pharmacy dispensing service.

2.2.3 Other cost recording forms were

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- C7: Recording form on cost of public utilities (see appendix, p. 125). These forms were composed of an electricity cost and water supply cost recording forms. Details of each form were as follows:

1) Recording form on electricity cost consisted of electricity items in each room of pharmacy department, quantity, and electric power of each electricity item. Daily electricity working time was estimated by interviewing the chief of outpatient pharmacy dispensing service.

2) Recording form on water supply cost was consisted of monthly expenditure of hospital's water supplies used during FY 2005 and the numbers of personnel in Ladyao Hospital.

- C8: Recording form on maintenance and repairing cost (see appendix, p. 128). This form was collected on maintenance expenditure or repairing cost of the equipments in pharmacy department during the FY 2005.

The researcher conducted the first draft recording forms to thesis advisors and 2 experts in order to check content validity. After that, the record forms were revised before using.

3.4 Ethical Considerations

This study has been approved in January, 26 2006 for the ethical issue to study in human being by the human right committee related to human studies. Informed consent was obtained from the pharmacy and financial staff according to the ethical guidelines and the Helsinki declaration. Summary details of the informed consent are as follows:

1. The staff had the right to cancel or quit to co-operate from this study any time. They need without any reasons informed to the researcher.

2. Permission for data collection was made by asking each individual's consent and explaining them towards the benefits and the pitfalls of studies.

3. Individual information such as names and addresses were not recorded and remained confidentially kept in secret. The results were presented as the overall findings. Each individual data was coded and anonymously analyze together.

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3.5 Data Collection

To collect the data of outpatient pharmacy dispensing service cost, the study procedure consisted of 3 steps as follows:

1. Preparation steps composed of:

1.1 To plan the ABC implementation in outpatient pharmacy dispensing service and the research instruments were created.

1.2 The permission letter for data collection in this study was sent from The Dean, Faculty of Graduated Studies to the director of Ladyao Hospital, chiefs of administrative department and pharmacy department.

1.3 The researcher committed with relevant staff to clear the objectives and processes of implement.

2. To document an activity dictionary (Figure 8)

2.1 Organizational analysis was performed both at the hospital level and at the pharmacy department level.

2.2 Activity analysis. First, the researcher interviewed the outpatient pharmacy dispensing service chief on activity identification in order to use as a guideline to formulate questionnaires. After that, all relevant staff; 16 pharmacy staff and 8 financial staff were asked to filled questionnaire towards their activities of work and time spent on each activity. In addition, the semi-structure interviews with staff were also conducted to clarify more data. The data obtained from self-administrated questionnaires, these data and work process of pharmacy dispensing service in outpatient unit were summarized to document an activity dictionary. Finally, an activity dictionary was checked for validity by 2 pharmacy chiefs. The activity dictionary was revised again before using to collect cost data.

2.3 The outpatient activities were obtained from records. After an activity dictionary documented, the output activities were collected from working records of outpatient pharmacy dispensing service during the FY 2005.

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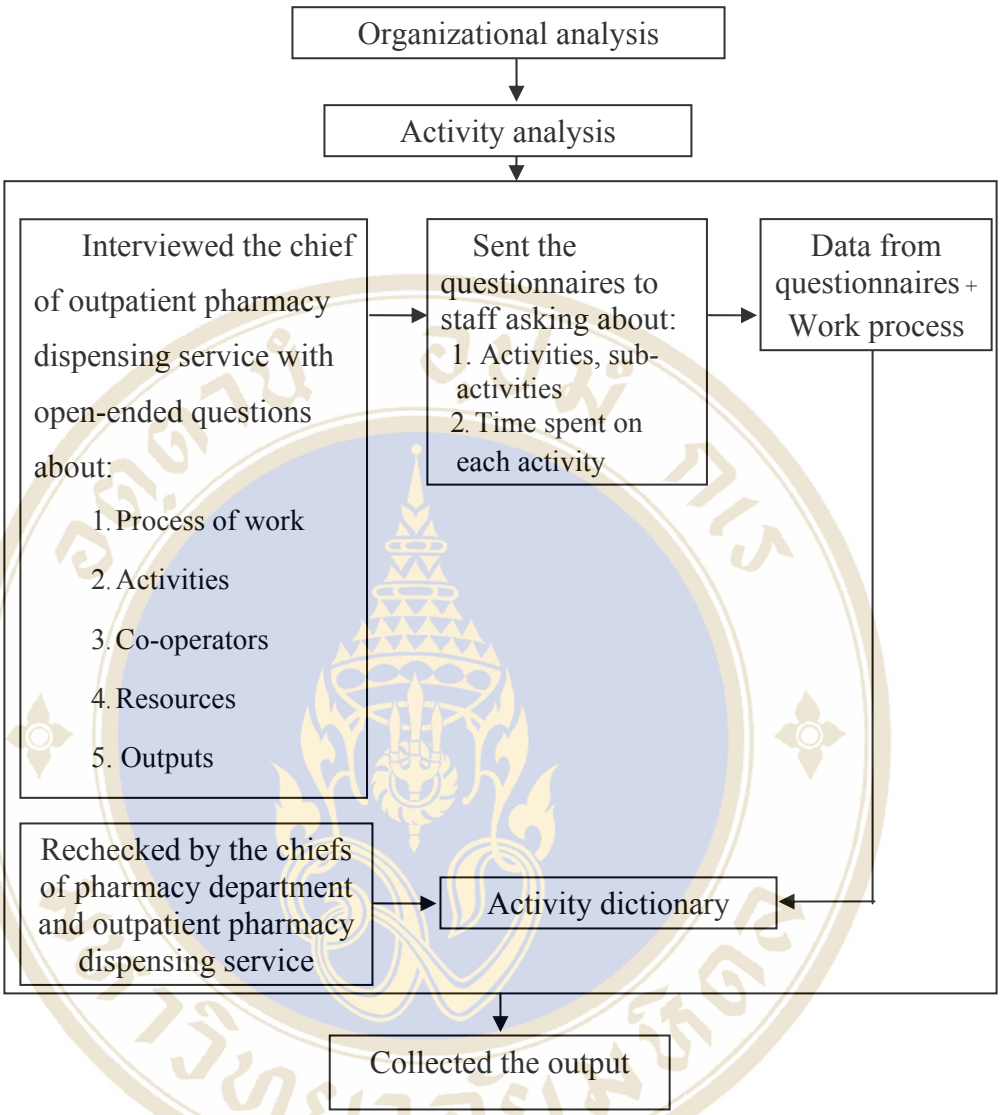

Figure 8 The steps of an activity dictionary documentation

3. Data collection

According to the cost element, collected cost data were collected and summarized as follows:

1. Capital costs (CC) were composed of depreciation cost of OPD building and equipments. These data were collected from administrative department and recorded in form C2 and C3 (see appendix, pp. 106-107). The monetary value of building and equipments were 1 Baht at the end of the useful life. Useful life of building and

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equipments were 20 and 5 years, respectively. The annual cost of building and equipments were calculated from the following equation:

- Depreciation cost = $\frac{\text{Acquisition cost}}{\text{Useful of aged (yr)}}$
- Residual value (Baht) = Time used (yr) x Depreciation cost
- Annual cost = $\frac{\text{(Acquisition cost) – (Residual value)}}{\text{Time used (yr)}}$

2. Recurrent costs were composed of:

2.1 Labor cost

2.1.1 Salaries, wages, overtime payment, position allowance, added benefit, medical fee, training/seminar payment, and other benefit of relevant staff were collected from the financial and accounting function of administrative department and recorded in C4.1 recording form (see appendix, p. 108).

2.1.2 Data from the questionnaire asking each staff about time spent on each activity of outpatient pharmacy dispensing service were collected and averaged.

2.1.3 Data from the form C4.1 and time spent were calculated as labor cost and percentage of working time spent on each activity as follows:

1) Working time of each staff was calculated and recorded in form C4.2 (see appendix, p. 109).

Working time during FY 2005

= working time on workday + working time on weekend----------(1)

- Working time on workday (hr) = (365-holiday) x 7
- Working time on weekend (hr) = number of overtime x 8

2) Calculated proportion of time spent on outpatient pharmacy dispensing service of each staff and recorded in form C4.3 (see appendix, p. 110).

- Collected working time on outpatient pharmacy dispensing service of each staff from service time table.
- Calculated proportion of time spent on outpatient pharmacy dispensing service from the following equation:

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Proportion of time spent on outpatient pharmacy dispensing service =

time spent on outpatient pharmacy dispensing service(hr) ----------(2)

(1)

3) Average time used on outpatient pharmacy dispensing service of each staff from questionnaires and calculated annual time spent of that activity.

- Annual time spent of that activity (hr) ----------(3)

= average time spent of that activity (hr) x amount of activity output

number of staff worked in the activity

4) Calculated working time in that activity.

- Working time in that activity (hr) = (2) x (3) ----------(4)

5) Calculated percentage of working time in that activity.

- Percentage of working time in that activity = $\frac{\sum (4) \times 100}{\text{Total working time spent for all activities}}$

2.2 Material costs (MC) were composed of:

2.2.1 Drug and medical supply used were collected from outpatient pharmacy dispensing service program and recorded in form C5. For preparation of the compounded drug activity which was produced 4 formulas for outpatient dispensing service, material costs for compounded drug were calculated from the amount of chemical substance used.

2.2.2 Office and household supply costs were collected from amount of material used for each activity. For shared office and household materials of pharmacy department, they were allocated to activities by proportion of working time in each activity.

2.3 Other costs were composed of:

2.3.1 Public utilities; water and electricity outlay were collected from financial and accounting function of administrative department by using utility cost recording form C7 (see appendix, 125). Electricity cost was calculated by multiplied electric power with working time used and was computed by using Provincial Electricity Authority (PEA) rate. The water supply expenditure of hospital were

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allocated to pharmacy department by percentage of personnel and allocated to each activity by proportion of working time in each activity.

- Cost of water supply in this service

$$= \frac{\text{(Total cost of water supply of hospital) x (Number of person in this service)}}{\text{Total number of persons in hospital}}$$

2.3.2 Maintenance/ repairing pharmacy equipment outlay were collected from maintenance and repairing function of administrative department by using recording form C8 (see appendix, p. 128). These outlays were allocated to activity by percentage of working in each activity.

As all steps of data collection mentioned above, Table 3 below was summarized sources of data collection for activity-based costing in Ladyao Hospital during the FY 2005.

Table 3 Sources of data collection

Recording forms	Data sources	Unit of data source	Note
C2: Depreciation cost of building	Building record	Administrative department	-
C3: Depreciation cost of equipments	Equipment record	Administrative department	Surveyed equipments located in pharmacy department on February 2006
C4.1: Labor cost	Salaries, wages, and other benefit accounting.	Financial and accounting function, Administrative department	Data collection was separated between civil servants and employees
C4.2: Working time	- Holiday and vacation records - Overtime table	- Pharmacy department - Administrative department	-

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Table 3 Sources of data collection (continued)

Recording forms	Data sources	Unit of data source	Note
C4.3: Proportion of time spent	Service time table	- Pharmacy department - Administrative department	-
C5: Cost of drugs and medical supplies	Outpatient pharmacy dispensing service program	Pharmacy department	-
C6: Office and household cost	Office and household withdrawing record	Pharmacy department	Observed materials used in outpatient pharmacy dispensing service on February 2006
C7: Public utility cost	Water and electricity accounting	Financial and accounting function, Administrative department	Surveyed electricity used in pharmacy department on February 2006
C8: Maintenance/ repairing cost	Maintenance/ repairing equipment record	Maintenance/ repairing function, Administrative department	-

3.6 Data Processing

Financial data of pharmacy service were analyzed by using the Microsoft Excels software. Statistics for data analysis were descriptive.

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CHAPTER IV
RESULTS

The purpose of this study was to analyze activity-based costs of pharmacy dispensing service of outpatient unit in Ladyao Hospital, Nakhonsawan Province during the fiscal year 2005 (From October 1, 2004 to September 30, 2005). The results of this study were presented into two parts as follows:

Part I: General information about pharmacy dispensing service in outpatient unit and activity dictionary

1. General information about pharmacy dispensing service in outpatient unit
2. The activity dictionary of pharmacy dispensing service in outpatient unit in Ladyao Hospital

Part II: The costs of pharmacy dispensing service in outpatient unit, which include:

1. Total cost
2. Capital costs consisting of:
   - 2.1 Depreciation cost of equipments, and
   - 2.2 Human investment capital cost
3. Recurrent costs consisting of:
   - 3.1 Labor cost
   - 3.2 Material costs are composed of:
     - Office and household supply cost, and
     - Cost of drugs and medical supplies
   - 3.3 Other costs consisting of:
     - Public utility cost, and
     - Maintenance/ repairing cost
4. The activity costs and unit cost of pharmacy dispensing service in outpatient unit

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Part I: General information on pharmacy dispensing service in outpatient unit and activity dictionary

1. General information on pharmacy dispensing service in outpatient unit

The pharmacy dispensing service in outpatient unit was the front line job which played a main role of the pharmacy department in Ladyao Hospital. There were 16 relevant staff from 19 persons of the pharmacy department (84.21%) and 8 financial staff of the administrative department. The staff in outpatient pharmacy dispensing service categorized as 1) civil servants: 8 pharmacists and 2 pharmacy technicians, 2) employees: 1 permanent employee and 6 temporary employees. In addition, there were 7 financial staff from administrative department who were rotated in responsibility on billing task in the pharmacy department for 8 hours daily (Table 4).

Table 4 Relevant staff in outpatient pharmacy dispensing service in the fiscal year 2005

Types of staff	Number (n = 24)	(%)
Civil servant staff:		
Pharmacist	8	33.33
Pharmacy technician	2	8.33
Employees:		
Permanent employee		
- Pharmacist assistant	1	4.17
Temporary employee		
- Pharmacy technicians	2	8.33
- Pharmacy assistants	3	12.50
- Financial staff	1	4.17
***Financial staff who rotated on the billing task	7	29.17

Total number of the prescriptions and items of drug used in the outpatient pharmacy dispensing service during the past 3 years are presented in Table 5.

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Table 5 Number of the prescriptions and items of drugs spent in the outpatient pharmacy dispensing service during the past 3 years (The FY 2003-2005)

FY	2003		2004		2005	
Month	**Prescriptions**	**items**	**prescriptions**	**items**	**prescriptions**	**items**
October	8,899	33,990	9,946	41,227	11,683	51,102
November	8,393	33,367	9,589	39,557	11,349	48,819
December	8,280	32,364	9,681	41,971	11,705	53,329
January	8,617	35,261	10,381	46,144	11,544	54,343
February	8,337	33,237	10,426	47,002	10,977	50,920
March	8,824	34,137	10,879	46,215	11,903	54,477
April	8,832	34,141	10,124	44,461	10,620	48,303
May	9,308	35,261	10,091	42,813	10,943	47,924
June	9,582	36,935	11,579	50,399	12,493	55,898
July	10,701	43,827	12,197	51,600	11,737	53,957
August	9,832	41,984	11,689	49,460	11,531	50,108
September	9,809	40,525	11,357	48,993	10,561	46,655
- Total	**109,414**	**435,029**	**127,939**	**549,842**	**137,046**	**615,835**
- Average	**9,118**	**36,252**	**10,662**	**45,820**	**11,420**	**51,320**
- Items : prescriptions	**3.98 : 1**		**4.30 : 1**		**4.49 : 1**	

Source: Ladyao Hospital, the prescription report of Pharmacy department, 2003-2005

In summary from Table 5, the number of prescriptions increased in June to July and ratio of the number of drug items to the prescriptions increased which ranged from 3.98 : 1 in 2003 to 4.49 : 1 in 2005.

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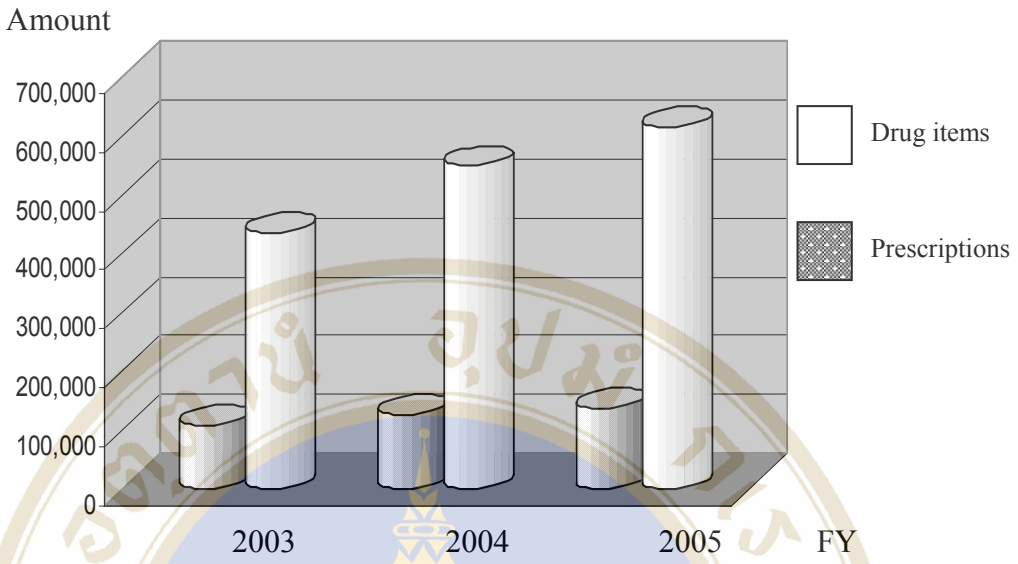

Figure 9 Number of the prescriptions and items of drugs spent in the outpatient pharmacy dispensing service for the past 3 years (The FY 2003-2005)

Source: Ladyao Hospital, the prescription report of Pharmacy department, 2003-2005

Figure 9 depicts the increasing trend of number of prescriptions and drug items spent in outpatient pharmacy dispensing service during the past 3 years.

2. The activity dictionary of pharmacy dispensing service in outpatient unit in Ladyao Hospital

The pharmacy dispensing service in outpatient unit, Ladyao Hospital had 7 activity pools, 18 activities and 40 sub-activities. The activity dictionary of pharmacy dispensing service in outpatient unit in Ladyao Hospital during the FY 2005 is presented in Table 6.

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Table 6 Activity dictionary

Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
1. Preparation	P1.1	Pre-pack the pill and prepare the foiled drug	1.1.1 Prepare the label of pre-pack drug	P2, P3	492	Time
			1.1.2 Pre-pack the pill	P2, P3	1,020	Time
			1.1.3 Record the pre-package	P2, P3	528	Time
			1.1.4 Prepare the foiled drug	P2, P3	144	Time
	P1.2	Preparation of equipments and place	1.2.1 Prepare and/or arrange the equipment	P2, P3	365	Time
			1.2.2 Clean room and others e.g., counter, shelves etc.	P2, P3	365	Time
	P1.3	Arrangement of service time table	1.3 Arrange service time table	P1	12	Paper
	P1.4	Preparation of the compounded drug	1.4.1 Calculate and prepare the compounded drug	P1, P2	60	Time
			1.4.2 Move and arrange the compounded drug on the pharmacy dispensing shelves	P2	60	Time

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Table 6 Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
2. Withdrawn drug from the main stock	S2.1	Checking and withdrawing drug from the main stock	2.1.1 Check the remain stock and calculate the withdrawn amount in sub-stock	P2	48	Time
			2.1.2 Withdraw drug from the main stock	P2, P3	48	Time
	S2.2	Arrangement of drug stock	2.2.1 Move drug from main stock to sub-stock	P2, P3	48	Time
			2.2.2 Arrange drug on the sub-stock and pharmacy dispensing shelves	P2,P3	48	Time
3. Dispensing	D3.1	Receive prescription and print the drug label	3.1.1 Screen prescription and form the patient's queue	P2, P3	137,046	Prescrip-tion
			3.1.2 Input the information of prescription on the computer	P2, P3	137,046	Prescrip-tion

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Table 6 Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
3. Dispensing (continued)	D3.1	Receive prescription and print the drug label (continued)	3.1.3 Conclude the expenditure and print the prescription and labels of drug	P2, P3	137,046	Prescrip-tion
			3.1.4 Stick the labels and put them into the drug basket	P2, P3	137,046	Prescrip-tion
	D3.2	Arrangement of drug dispensing	3.2.1 Arrange drug	P2, P3	137,046	Prescrip-tion
			3.2.2 Drug arranger sings in and form queue	P2, P3	137,046	Prescrip-tion
	D3.3	Checking drug	3.3.1 Check drug	P1	137,046	Prescrip-tion
			3.3.2 Form the queue again	P1	137,046	Prescrip-tion

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Table 6 Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
3. Dispensing (continued)	D3.4	Dispensing	3.4.1 Double check drug	P1	137,046	Prescrip-tion
			3.4.2 Dispense and advice	P1	137,046	Prescrip-tion
			3.4.3 Classify the prescription according to the patient's right	P1	137,046	Prescrip-tion
	D3.5	Billing	3.5.1 Send the prescription to the financial personnel	P2	58,500	Bill
			3.5.2 Call the patient's name and bill	F	58,500	Bill
4. Counseling	C4.1	Problem identification and provide counseling	4.1.1 Meet and take the patient to the counseling room	P1	115	Time
			4.1.2 Examine the medication history of patient	P1	115	Time

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Table 6 Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
4. Counseling (continued)	C4.1	Problem identification and provide counseling	4.1.3 Counseling	P1	115	Time
			4.1.4 Conclude and record counseling	P1	115	Time
5. Averse Event Reaction(AER)	A5.1	Become aware of and resolve AER	5.1.1 Meet uncertain AER case	P1	95	Case
			5.1.2 Examine the history of patient and assess symptom	P1	95	Case
			5.1.3 Conclude, record and/or give AER card	P1	95	Case
6. Detection medication error	M6.1	Become aware of and resolve medication error	6.1.1 Check and classify medication error	P1	2,691	Time
			6.1.2 Resolve medication error	P1	2,691	Time
			6.1.3 Record medication error	P1	2,691	Time

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Table 6 Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
7. Reporting	R7.1	Prescription reporting	7.1 Count the prescription and calculate the expenditure of treatment	P2, P3	12	Paper
	R7.2	Counseling reporting	7.2 Report counseling conclusion	P1	12	Paper
	R7.3	AER reporting	7.3 Report AER conclusion	P1	85	Paper
	R7.4	Medication reporting	7.4 Report medication error conclusion	P1	12	Paper

Remark: P1 = Pharmacist
P2 = Pharmacy technician
P3 = Pharmacist assistant
F = Financial staff

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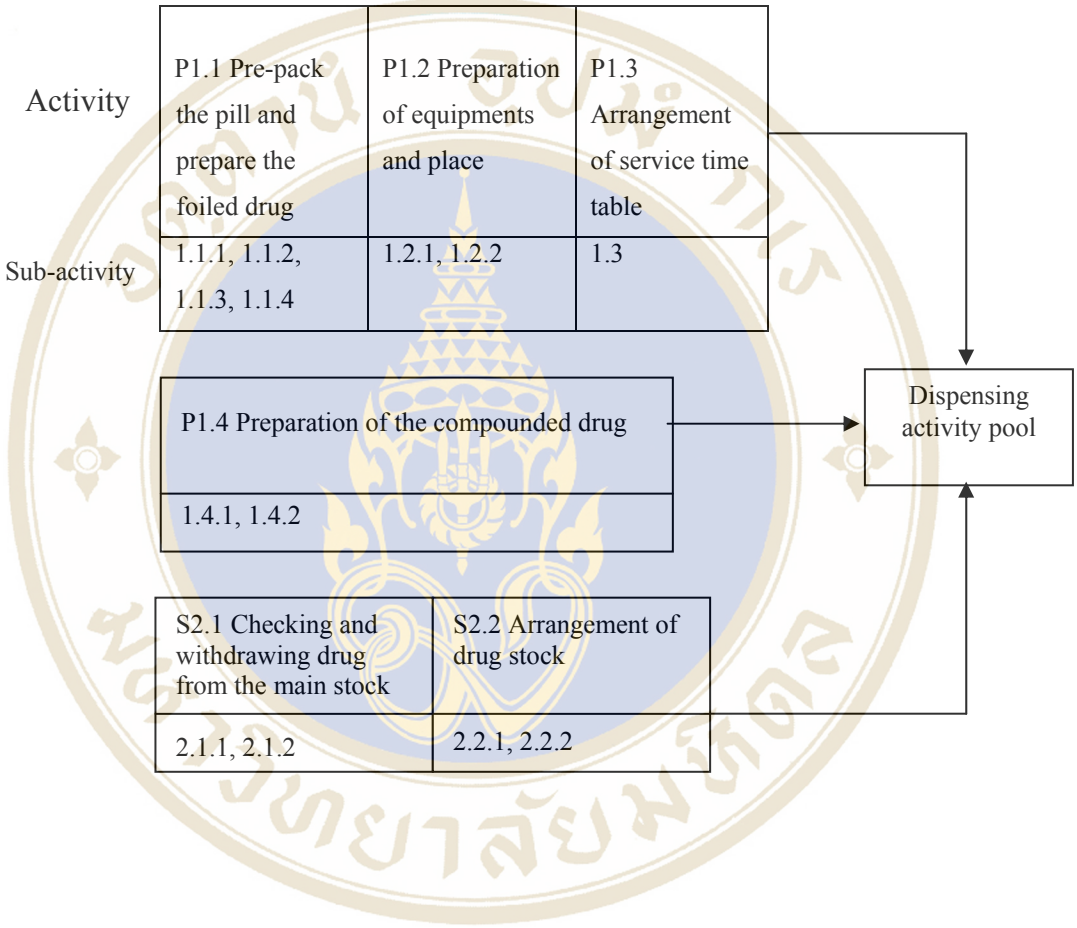
Details of each activity are presented by the flow chart of all activity processes as shown in Figure 10.

Preparation activity pool and drug withdrawing activity pool



Adverse Event Reaction (AER) activity pool and AER reporting

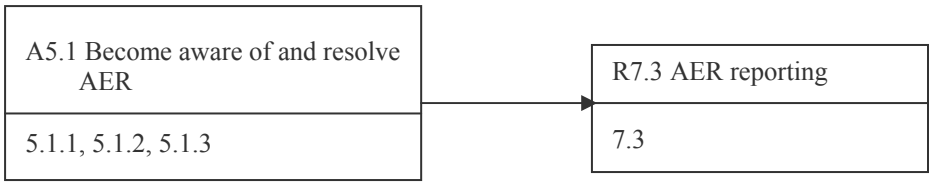


Figure 10 Flow process chart of the pharmacy dispensing service in outpatient unit in Ladyao Hospital

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Dispensing, counseling, detection of medication error activity pools and reporting activities

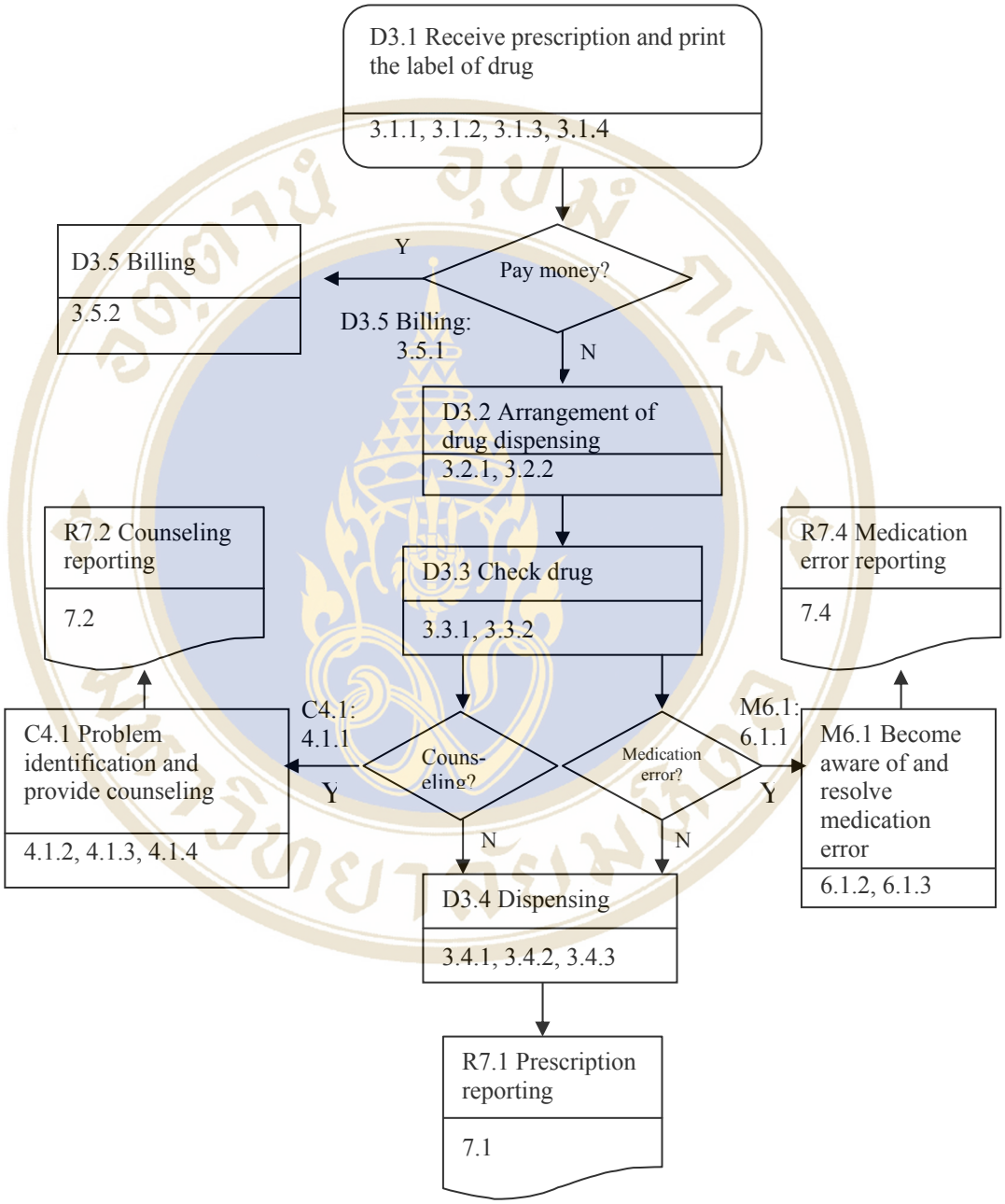

Figure 10 Flow process chart of the pharmacy dispensing service in outpatient unit in Ladyao Hospital (continued)

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From Figure 10, each activity pool was composed of activities as follows:

1. The preparation activity pool was composed of 4 activities:

P1.1 Pre-pack the pill and prepare the foiled drug activity was composed of 4 sub-activities as follows:

1.1.1 Prepare the label of pre-pack drug

1.1.2 Pre-pack the pill

1.1.3 Record the pre-package, and

1.1.4 Prepare the foiled drug

P1.2 Preparation of equipments and place activity was composed of 2 sub-activities as follows:

1.2.1 Prepare and/or arrange the equipments in pharmacy dispensing room, and

1.2.2 Clean room and others e.g., counter, shelves, etc.

P1.3 Arrangement of service time table activity had 1 sub-activity such as the arrangement of service time table sub-activity.

P1.4 Preparation of the compounded drug activity was composed of 2 sub-activities as follows:

1.4.1 Calculate and prepare the compounded drug, and

1.4.2 Move and arrange the compounded drug on the pharmacy dispensing shelves

2. Drug withdrawing activity pool was composed of 2 activities:

S2.1 Checking and withdrawing drug from the main stock activity was composed of 2 sub-activities as follows:

2.1.1 Check the remain stock and calculate the withdrawn amount in sub-stock, and

2.1.2 Withdraw drug from the main stock

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S2.2 Arrangement of drug stock activity was composed of 2 sub-activities as follows:

2.2.1 Move drug from main stock to sub-stock, and

2.2.2 Arrange drug on the sub-stock and pharmacy dispensing shelves

3. Dispensing activity pool composed of 5 activities:

D3.1 Receive prescription and print label of drug activity was composed of 4 sub-activities as follows:

3.1.1 Screen prescription and form the patient's queue

3.1.2 Input the information of prescription on the computer

3.1.3 Conclude the expenditure and print the prescription and labels of drug, and

3.1.4 Stick the labels and put them into the drug basket

D3.2 Arrangement of drug dispensing activity was composed of 2 sub-activities as follows:

3.2.1 Arrange drug, and

3.2.2 Drug arranger sings in and form queue

D3.3 Check drug activity was composed of 2 sub-activities as follows:

3.3.1 Check drug, and

3.3.2 Form the queue again

D3.4 Dispensing activity was composed of 3 sub-activities as follows:

3.4.1 Double check drug

3.4.2 Dispense and advice, and

3.4.3 Classify the prescription according to the patient's right

D3.5 Billing activity had only 2 sub-activities as follows:

3.5.1 Send the prescription to the financial personnel, and

3.5.2 Call the patient's name and bill

4. Counseling activity pool had only 1 activity such as

C4.1 Problem identification and provide counseling activity was composed of 4 sub-activities as follows:

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4.1.1 Meet and take the patient to the counseling room

4.1.2 Examine the medication history of patient

4.1.3 Counseling, and

4.1.4 Conclude and record counseling

5. AER activity pool had only 1 activity such as

A5.1 Become aware of and resolve AER activity was composed of 3 sub-activities as follows:

5.1.1 Meet uncertain AER case

5.1.2 Examine the history of patient and assess symptom, and

5.1.3 Conclude, record and/or give AER card

6. Detection medication error activity pool had only 1 activity such as

M6.1 Become aware of and resolve medication error activity was composed of 3 sub-activities as follows:

6.1.1 Check and classify medication error

6.1.2 Resolve medication error

6.1.3 Record medication error

7. Reporting activity pool was composed of 4 activities as follows:

R7.1 Prescription reporting activity had 1 sub-activity such as counting the prescriptions and calculation the expenditure of treatment sub-activity.

R7.2 Counseling reporting activity had 1 sub-activity such as report counseling conclusion sub-activity.

R7.3 AER reporting activity had 1 sub-activity such as report AER conclusion sub-activity.

R7.4 Medication error reporting activity had 1 sub-activity such as report medication error conclusion sub-activity.

The output activity and time spent on each activity in the outpatient pharmacy dispensing service, Ladyao Hospital during the FY 2005 are presented in Table 7.

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Table 7 Output and time spent on each activity

Activity Pools	Activities	Amount	Output	Time spent per output (minute)
1. Preparation step	P1.1 Pre-pack the pill and prepare the foiled drug			
	- Pill	1,020	Time	107.93
	- Foiled drug	144	Time	24.00
	P1.2 Preparation of equipments and place	365	Time	33.00
	P1.3 Arrangement of service time table	12	Paper	30.00
	P1.4 Preparation of the compounded drug	60	Time	120.00
2. Drug withdrawing	S2.1 Checking and withdrawing drug from main stock	48	Time	180.00
	S2.2 Arrangement of drug stock	48	Time	350.42
3. Dispensing step	D3.1 Receive prescription and print the label of drug	137,046	Prescrip-tion	2.98
	D3.2 Arrangement for drug dispensing	137,046	Prescrip-tion	3.03

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Table 7 Output and time spent on each activity (continued)

Activity Pools	Activities	Amount	Output	Time spent per output (minute)
3. Dispensing step (continued)	D3.3 Checking drug	137,046	Prescrip-tion	2.31
	D3.4 Dispensing	137,046	Prescrip-tion	4.80
	D3.5 Billing	58,500	Bill	6.57
4. Counseling	C4.1 Problem identification and provide counseling	115	Time	18.64
5. Detection of AER	A5.1 Become aware of and resolve AER	95	Case	27.88
6. Detection of medication error	M6.1 Become aware of and resolve medication error	2,691	Time	4.19
7. Reporting step	R7.1 Prescription reporting	12	Paper	40.00
	R7.2 Counseling reporting	12	Paper	60.00
	R7.3 AER reporting	85	Paper	480.00
	R7.4 Medication error reporting	12	Paper	180.00

Total time spent on pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005 was 20,594 hours or accounted to 49.73% of total working time. The highest average time spent on each activity in the activity pool, were as follows:

1. For the preparation activity pool, the pre-packing the pill and preparation of the foiled drug activity was the highest time spent (131.93 minutes/ time or 2

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hours/ time), followed by the preparation of the compounded drug activity (120 minutes/ time or 2 hours/ time).

2. For the drug withdrawing activity pool, arrangement of drug stock activity was the highest time spent (350.42 minutes/ time or 6 hours/ time), followed by the checking and withdrawing drug from main stock (180 minutes/ time or 3 hours/ time).

3. For the dispensing activity pool, the billing activity was the highest time spent (6.57 minutes/ bill), followed by the dispensing activity (4.80 minute/ prescription).

4. For the counseling, AER, and detection of medication error activity pool, the time spent on activity were 18.64 minutes/ time, 27.88 minutes/ case, 4.19 minutes/ time, respectively.

5. For reporting activity pool, the AER reporting activity was the highest time spent (480 minutes/ paper or 8 hours/ paper).

Part II: Cost analysis of pharmacy dispensing service in outpatient unit:

1. Total cost

Total cost of the pharmacy dispensing service in outpatient unit was 12,223,331.27 Baht. Recurrent cost and capital cost were 96.46% (11,790,563.08 Baht) and 3.54% of total cost (432,768.21 Baht). The dispensing activity cost was the highest (10,608,141.59 Baht) and accounted for 86.79% of total cost, followed by the receive prescription and print the label activity and billing activity which were 494,354.91 Baht (4.04% of total cost) and 421,005.06 Baht (3.44% of total cost) (Table 8).

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Table 8 Total cost of pharmacy dispensing service in outpateint unit, Ladyao Hospital in the FY 2005

Activities	Capital cost		Recurrent cost						Total cost	
			Labor cost		Material cost		Other costs			
	Amount(Baht)	%	Amount(Baht)	%	Amount(Baht)	%	Amount(Baht)	%	Amount(Baht)	%
Pre-pack the pill and prepare the foiled drug	16,163.74	3.73	35,377.66	2.81	2,277.34	0.02	3,460.09	3.73	57,278.83	0.47
Equipment and place preparation	2,321.33	0.54	4,764.48	0.38	6,578.84	0.06	496.91	0.54	14,161.56	0.12
Service time table arrangement	36.48	0.01	200.82	0.02	69.50	6.66*	7.81	0.01	314.61	25.74*
Prepare the compounded drug	1,352.73	0.31	3,409.82	0.27	38,442.67	0.37	289.57	0.31	43,494.79	0.36
Checking and withdrawing drug from main stock	1,502.59	0.35	4,815.56	0.38	326.90	31.32*	321.65	0.35	6,966.70	0.06
Drug arrangement for stock	3,416.40	0.79	7,374.95	0.59	350.76	33.61*	731.33	0.79	11,873.44	0.10
Receive prescription and print the label of drug	76,399.79	17.65	179,664.47	14.25	221,936.14	2.13	16,354.51	17.65	494,354.91	4.04
Drug arrangement for dispensing	78,979.33	18.25	188,566.09	14.96	8,286.84	0.08	16,906.70	18.25	292,738.96	2.39
Checking drug	38,713.28	8.95	184,036.81	14.60	4,024.72	0.04	8,287.16	8.95	235,061.97	1.92
Dispensing	80,335.29	18.56	381,901.25	30.30	10,128,708.08	97.04	17,196.97	18.56	10,608,141.59	86.79
Billing	126,767.39	29.29	242,195.81	19.22	24,905.42	0.24	27,136.45	29.29	421,005.06	3.44
Problem investigation and counseling	279.44	0.06	1,322.78	0.10	703.47	0.01	59.82	0.06	2,365.51	0.02

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Table 8 Total cost of pharmacy dispensing service in outpateint unit, Ladyao Hospital in the FY 2005 (continued)

Activities	Capital cost		Recurrent cost						Total cost	
			Labor cost		Material cost		Other costs			
	Amount(Baht)	%	Amount(Baht)	%	Amount(Baht)	%	Amount(Baht)	%	Amount(Baht)	%
Become aware of and resolve AER	318.03	0.07	1,517.47	0.12	108.47	10.39*	68.08	0.07	2,012.05	0.02
Aware and resolve medication error	1,423.79	0.33	6,768.51	0.54	208.39	19.97*	304.78	0.33	8,705.47	0.07
Prescription reporting	105.31	0.02	293.72	0.02	8.99	0.86*	22.54	0.02	430.56	0.00
Counseling reporting	119.14	0.03	585.66	0.05	13.49	1.29*	25.50	0.03	743.79	0.01
AER reporting	4,315.29	1.00	16,447.60	1.30	449.69	43.08*	923.75	1.00	22,136.33	0.18
Medication error reporting	218.86	0.05	1,204.95	0.10	74.48	7.14*	46.85	0.05	1,545.14	0.01
Total(Baht)	432,768.21	100.00	1,260,448.41	100.00	10,437,474.19	100.00	92,640.47	100.00	12,223,331.27	100.00

Remark: * = $X\,10^{-4}$

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2. Capital costs

Expired building was not taken into account (more than 20 years life used). For this reason, in Ladyao Hospital, OPD building that was built since 1980 to 1982 was not calculated in the depreciation cost. Depreciation cost of equipment was not analyzed when the time used was over 5 years. Moreover, in this study, there are two pharmacists who are studying in the postgraduate. Therefore, their labor cost was classified into the human capital investment cost as presented in the Table 9.

Table 9 The capital costs of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Capital cost(Baht)		Total(Baht)
	Human investment	Equipment	
- Pre-pack the pill and prepare the foiled drug	9,210.42	6,953.31	16,163.73
- Preparation of equipments and place	1,322.74	998.59	2,321.33
- Arrangement of service time table	20.79	15.69	36.48
- Preparation of the compounded drug	770.81	581.92	1,352.73
- Checking and withdrawing drug from the main stock	856.20	646.39	1,502.59
- Arrangement of drug stock	1,946.73	1,469.67	3,416.40
- Receive prescription and print the drug label	43,534.13	32,865.66	76,399.79
- Arrangement of drug dispensing	45,004.01	33,975.32	78,979.33
- Checking drug	22,059.61	16,653.68	38,713.29
- Dispensing	45,776.66	34,558.63	80,335.29
- Billing	72,234.60	54,532.79	126,767.39
- Problem identification and counseling	159.23	120.21	279.44

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Table 9 The capital costs of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005 (continued)

Activities	Capital cost(Baht)		Total(Baht)
	Human investment	Equipment	
- Become aware of and resolve AER	181.22	136.81	318.03
- Become aware of and resolve medication error	811.30	612.49	1,423.79
- Prescription reporting	60.01	45.30	105.31
- Counseling reporting	67.89	51.25	119.14
- AER reporting	2,458.94	1,856.35	4,315.29
- Medication error reporting	124.71	94.15	218.86
Total (Baht)	**246,600.00**	**186,168.21**	**432,768.21**

From the Table 9, the total capital cost was 432,768.21 Baht which was composed of the human investment capital cost 56.98% of capital cost and the depreciation cost of equipments 43.02 % of capital cost. The billing activity spent the highest capital cost (126,767.39 Baht, 29.29% of capital cost), followed by the dispensing activity 80,335.29 Baht, 18.56% of capital cost and the arrangement of drug dispensing activity 78,979.33 Baht, 18.25% of capital cost, respectively.

3. Recurrent costs consisting of:

3.1 Labor cost

As shows in Table 8, the labor cost of outpatient pharmacy dispensing service which was 1,260,448.41 Baht. It was calculated as 10.69% of recurrent cost and 10.31% of total cost. Among all activities, dispensing activity possessed the highest labor cost (381,901.25 Baht, 30.30% of total labor cost), followed by the billing activity was 242,195.81 Baht (19.22% of total labor cost) and the arrangement of drug dispensing activity was 188,566.09 Baht (14.96% of total labor cost), respectively. While the service time table arrangement activity consumed the lowest labor cost (200.82 Baht, 0.02% of total labor cost).

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3.2 Material costs

Material costs were divided into 2 expenditures: 1) the office and household supply costs, and 2) cost of drugs and medical supplies. The drugs and medical supplies took very high cost (10,153,301.33 Baht) and accounted for 86.11% of recurrent cost or 83.06% of total cost, hence the dispensing activity possessed the highest material cost (10,128,708.08 Baht; 97.04% of material cost), followed by the received prescription and printed the label of drug activity was 221,936.14 Baht (2.13% of material cost) and preparation of the compounded drug activity was 38,442.67 Baht (0.37% of material cost), respectively (Table 10).

Table 10 Material costs of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Material costs (Baht)		Total (Baht)
	Offices& households	Drugs and medical supplies	
- Pre-pack the pill and prepare the foiled drug	2277.34	0.00	2,277.34
- Preparation of equipments and place	6578.84	0.00	6,578.84
- Arrangement of service time table	69.50	0.00	69.50
- Preparation of the compounded drug	4824.67	33,618.00	38,442.67
- Checking and withdrawing drug from main stock	326.90	0.00	326.90
- Arrangement of drug stock	350.76	0.00	350.76
- Receive prescription and print the label of drug	221,936.14	0.00	221,936.14
- Arrangement of drug dispensing	8,286.84	0.00	8,286.84
- Checking drug	4,024.72	0.00	4,024.72

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Table 10 Material costs of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005 (continued)

Activities	Material costs (Baht)		Total (Baht)
	Offices& households	Drugs and medical supplies	
- Dispensing	9,024.75	10,119,683.33	10,128,708.08
- Billing	24,905.42	0.00	24,905.42
- Problem identification and provide counseling	703.47	0.00	703.47
- Become aware of and resolve AER	108.47	0.00	108.47
- Become aware of and resolve medication error	208.39	0.00	208.39
- Prescription reporting	8.99	0.00	8.99
- Counseling reporting	13.49	0.00	13.49
- AER reporting	449.69	0.00	449.69
- Medication error reporting	74.48	0.00	74.48
Total (Baht)	**284,172.86**	**10,153,301.33**	**10,437,474.19**

3.3 Other costs

These costs were divided into 2 expenditures: 1) utility cost, and 2) maintenance and repairing cost. The other cost of outpatient pharmacy dispensing service was 92,640.48 Baht which was composed of the utility cost 97.62% of other costs and the maintenance and repairing cost 2.37% of other costs. The billing activity was the highest other costs (27,136.45 Baht, 29.29%of other costs), followed by the dispensing activity was 17,196.97 Baht (18.56% of other cost) and arrangement of drug dispensing activity was 16,906.70 Baht (18.25% of other cost), respectively (Table 11).

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Table 11 Other costs of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Other costs (Baht)		Total (Baht)
	Utilities	Maintenance and repairing	
- Pre-pack the pill and prepare the foiled drug	3,377.92	82.17	3,460.09
- Preparation of equipments and place	485.11	11.80	496.91
- Arrangement of service time table	7.62	0.19	7.81
- Preparation of the compounded drug	282.70	6.88	289.58
- Checking and withdrawing drug from main stock	314.01	7.64	321.65
- Arrangement of drug stock	713.96	17.37	731.33
- Receive prescription and print the label of drug	15,966.13	388.38	16,354.51
- Arrangement of drug dispensing	16,505.21	401.50	16,906.70
- Checking drug	8,090.35	196.80	8,287.15
- Dispensing	16,788.58	408.39	17,196.97
- Billing	26,492.02	644.43	27,136.45
- Problem identification and provide counseling	58.40	1.42	59.82
- Become aware of and resolve AER	66.46	1.62	68.08
- Become aware of and resolve medication error	297.54	7.24	304.78
- Prescription reporting	22.01	0.54	22.54

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Table 11 Other costs of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005 (continued)

Activities	Other costs (Baht)		Total (Baht)
	Utilities	Maintenance and repairing	
- Counseling reporting	24.90	0.61	25.50
- AER reporting	901.81	21.94	923.75
- Medication error reporting	45.74	1.11	46.85
Total (Baht)	**90,440.48**	**2,200.00**	**92,640.48**

4. The activity costs and unit cost of pharmacy dispensing service in outpatient unit. The results of activity costs are shown by categorized into 7 activity pools as follows:

4.1 Preparation activity pool

The preparation activity pool was composed of 4 activities: 1) pre-packing the pill and preparing the foiled drug, 2) equipments and place preparation, 3) arrangement of service time table, and 4) preparation of the compounded drug. The activity costs of this activity pool are presented in Table 12.

Table 12 The activity costs of preparation activity pool in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/time)
P1.1 Pre-packing the pill and preparing the foiled drug	1.1.1 Prepare the label of pre-pack drug	11,689.86	492	Time	23.76
	1.1.2 Pre-pack the pill	31,295.15	1,020	Time	30.68
	1.1.3 Prepare the foiled drug	11,172.88	528	Time	21.16
	1.1.4 Record the pre-package	3,120.93	144	Time	21.67

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Table 12 The activity costs of preparation activity pool in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005 (continued)

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/time)
P1.2 Preparation of equipments and place	1.2.1 Prepare and/or arrange the equipment in pharmacy dispensing room	2,583.47	365	Time	7.08
	1.2.2 Clean room and others	11,578.09	365	Time	31.72
P1.3 Arrangement of service time table	1.3 Arrange service time table	314.61	12	Paper	26.22
P1.4 Preparation of the compounded drug	1.4.1 Calculate and prepare the compounded drug	42,533.43	60	Time	708.89
	1.4.2 Move and arrange the compounded drug	961.37	60	Time	16.02
	Total (Baht)	**115,249.79**			

As shows in Table 12, the highest activity cost of this activity pool was in the pre-packing of pill and preparing the foiled drug activity (57,278.81 Baht, 49.70% of total activity pool cost). The lowest cost was in the arrangement of service time table

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activity (314.61 Baht, 0.27% of total activity pool cost). Furthermore, each activity was composed of sub-activities which are presented as follows:

P1.1 Pre-packing the pill and preparing the foiled drug activity was composed of 4 sub-activities. The pre-packing the pill sub-activity cost was the highest (31,295.15 Baht, 54.64% of this total activity cost) and the unit cost in this sub-activity was also the highest (30.68 Baht). The lowest unit cost was found in the foiled drug preparation sub-activity (21.67 Baht).

P1.2 Preparation of equipments and place activity was composed of 2 sub-activities. Cleaning room and others sub-activity cost was the highest (11,578.09 Baht, 81.76% of this total activity cost) and the unit cost in this sub-activity was the highest (31.72 Baht).

P1.3 Arrangement of service time table activity had 1 sub-activity and the total cost of this activity was 314.61 Baht and the unit cost was 26.22 Baht.

P1.4 Preparation of the compounded drug activity was composed of 2 sub-activities. The calculation and preparation of compounded drug sub-activity cost was the highest cost of this activity and of this activity pool (42,533.42 Baht, 97.79% of this total activity cost, 36.90% of total preparation activity pool cost). The unit cost of this sub-activity was 708.89 Baht.

4.2 Drug withdrawing activity pool

The drug withdrawing activity pool which was composed of 2 activities such as the checking and withdrawing drug from the main stock activity, and arrangement of drug stock activity, the sub-activity costs of this activity pool are presented in Table 13.

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Table 13 The activity costs of drug withdrawing activity pool in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/time)
S2.1 Checking and drug withdraw-ing	2.1.1 Check the remain stock and calculate the withdrawn amount in sub-stock	438.22	48	Time	9.13
	2.1.2 Withdraw drug from the main stock	6,528.48	48	Time	136.01
S2.2 Arrange-ment of drug stock	2.2.1 Move the drug from the main stock to sub-stock	10,491.05	48	Time	218.56
	2.2.2 Arrange the drug on the sub-stock and pharmacy dispensing shelves	1,382.40	48	Time	28.80
	Total(Baht)	**18,840.15**			

Table 13 shows the highest cost activity of this activity pool was the arrangement of drug stock activity (11,873.45 Baht, 63.02% of this total activity pool cost). In addition, each activity was composed of sub-activities which are presented as follows:

S2.1 The checking and withdrawing drug from main stock activity was composed of 2 sub-activities. The withdrawn drug from the main stock sub-activity cost was the highest (6,528.48 Baht, 93.70% of this total activity cost) and its unit cost was 136.01 Baht.

S2.2 The arrangement of drug stock activity was also composed of 2 sub-activities. The moving drug from the main stock to sub-stock sub-activity cost was the

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highest of this activity and of this activity pool (10,491.05 Baht, 88.36% of this total activity cost), the unit cost was 218.56 Baht.

4.3 Dispensing activity pool

The biggest activity pool in this study was the dispensing activity pool which was composed of 5 activities (Table 14).

Table 14 Activity-based costs of dispensing activity pool of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/ prescrip-tion)
D3.1 Receive prescription and print the label of drug	3.1.1 Screen prescription and form the patient's queue	41,981.67	137,046	Prescrip-tion	0.31
	3.1.2 Input the information of prescription on the computer	103,199.73	137,046	Prescrip-tion	0.76
	3.1.3 Conclude the expenditure and print the prescription and labels of drug	166,540.25	137,046	Prescrip-tion	1.22
	3.1.4 Stick the labels and put them into the drug basket	179,633.26	137,046	Prescrip-tion	1.31

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Table 14 Activity-based costs of Dispensing activity pool of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005 (continued)

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/ prescrip-tion)
D3.2 Arrangement of drug dispensing	3.2.1 Arrange drug	217,758.25	137,046	Prescrip-tion	1.59
	3.2.2 Drug arranger sings in and form queue	74,980.71	137,046	Prescrip-tion	0.55
D3.3 Checking drug	3.3.1 Check drug	177,883.40	137,046	Prescrip-tion	1.30
	3.3.2 Form the queue again	57,178.57	137,046	Prescrip-tion	0.42
D3.4 Dispensing	3.4.1 Double check drug	133,413.68	137,046	Prescrip-tion	0.97
	3.4.2 Dispense and advise	10,437,836.58	137,046	Prescrip-tion	76.16
	3.4.3 Classify the prescription according to the patient's right	36,891.33	137,046	Prescrip-tion	0.27
D3.5 Billing	3.5.1 Send the prescription to the financial personnel	62,364.75	58,500	Prescrip-tion	1.07
	3.5.2 Call the patient's name and bill	162,240.31	58,500	Prescrip-tion	2.77
	Total (Baht)	**11,854,902.50**			

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The highest activity cost in dispensing activity pool was dispensing activity (10,608,141.59 Baht, 89.48% of this total activity pool cost). The lowest cost was the checking drug activity (235,061.97 Baht, 1.95% of this total activity pool cost). Each activity was composed of sub-activities presented as follows:

D3.1 Receive prescription and print the label of drug activity was composed of 4 sub-activities. The stick on drug label and put them into the drug basket sub-activity cost was the highest (179,633.26 Baht, 36.34% of this total activity cost) and its unit cost was 1.31 Baht. The cost for prescription screening and form the patient's queue sub-activity was the lowest and equal to 41,981.67 Baht (8.49% of this total activity cost) and the unit cost was 0.31 Baht.

D3.2 Arrangement of drug dispensing activity was composed of 2 sub-activities. The drug arrangement sub-activity cost was the highest (217,758.25 Baht, 74.39% of this total activity cost) and the unit cost was 1.59 Baht.

D3.3 Checking drug activity was composed of 2 sub-activities. The drug checking sub-activity cost was the highest (177,883.40 Baht, 75.67% of this total activity cost) and the unit cost was 1.30 Baht.

D3.4 Dispensing activity took the main shared cost and was composed of 3 sub-activities. The dispensed and advised sub-activity cost was the highest of this activity and of this activity pool (10,437,836.58 Baht, 98.39% of this total activity cost, 86.42% of this activity pool cost) and the unit cost was 76.16 Baht. The classification of prescription sub-activity cost was the lowest equal to 36,891.34 Baht (0.35% of this total activity cost) and the unit cost was 0.27 Baht.

D3.5 Billing activity was composed of 2 sub-activities. The calling patient's name and billing sub-activity cost was the highest (384,992.03 Baht, 86.06% of this total activity cost) and the unit cost was 6.58 Baht.

4.4 Counseling activity pool

This activity pool was composed of only one activity such as the problem identification and provides counseling activity which was divided into 4 sub-activities. Activity-based costs of counseling activity pool are presented in Table 15.

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Table 15 Activity-based costs of counseling activity pool in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/time)
C4.1 Problem identification and provide counseling	4.1.1 Meet and take the patient to the counseling room	429.74	115	Time	3.74
C4.1 Problem identification and provide counseling (continued)	4.1.2 Examine the medication history of patient	405.93	115	Time	3.53
	4.1.3 Counseling	1,065.09	115	Time	9.26
	4.1.4 Conclude and record	464.75	115	Time	4.04
Total (Baht)		**2,365.51**			

As presents in Table 15, the counseling sub-activity cost was the highest (1,065.09 Baht, 45.03% of this total activity pool cost) and the unit cost was 9.26 Baht. The examined patient medication history sub-activity cost was the lowest and equal to 405.93 Baht (17.16% of this total activity cost) and the unit cost was 3.53 Baht.

4.5 Adverse Event Reaction (AER) activity pool.

This activity pool was composed of become aware of and resolve AER activity which had 3 sub-activities. The activity-based costs of AER activity pool are presented in Table 16.

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Table 16 The activity-based costs of AER activity pool in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY2005

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/case)
A5.1 Become aware of and resolve AER	5.1.1 Meet uncertain AER case	508.01	95	Case	5.35
A5.1 Become aware of and resolve AER (continued)	5.1.2 Examine the patient medication history and assess symptoms	884.54	95	Case	9.31
	5.1.3 Conclude, record and/or give AER card	619.51	95	Case	6.52
Total (Baht)		**2,012.06**			

As presents in Table 16, the examined patient medication history and symptom assessment sub-activity cost was the highest (884.54 Baht, 43.96% of this total activity pool cost) and the unit cost was 9.31 Baht. The meeting of uncertain AER case sub-activity cost was the lowest equal to 508.01 Baht (25.25% of this total activity pool cost) and the unit cost was 5.32 Baht.

4.6 Detection of medication error activity pool

This activity pool was composed of becoming aware of and resolve medication error activity which was divided into 3 sub-activities. The activity-based costs of detection medication error activity pool are presented in Table 17.

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Table 17 The activity-based costs of detection medication error activity pool in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/time)
M6.1 Become aware of and resolve medication error	6.1.1 Check and classify medication error	2,331.62	2,691	Time	0.87
	6.1.2 Resolve medication error	4,838.22	2,691	Time	1.80
	6.1.3 Record medication error	1,375.26	2,691	Time	0.51
Total(Baht)		**8,545.09**			

As presents in Table 17, the resolved medication error sub-activity cost was the highest (4,906.82 Baht, 56.36% of this total activity pool cost) and the unit cost was 1.82 Baht. The lowest cost was the medication error recording sub-activity (1,376.40 Baht, 15.81% of this total activity pool cost) and the unit cost was 0.51 Baht.

4.7 Reporting activity pool

The reporting activity pool was composed of 4 reporting activities. The activity-based costs of reporting activity pool are presented in Table 18.

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Table 18 The activity-based costs of reporting activity pool in pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY2005

Activities	Sub-activities	Total cost (Baht)	Amount	Unit	Unit cost (Baht/paper)
R7.1 Prescription reporting	7.1 Count the prescription and calculate the expenditure of treatment	430.56	12	Paper	35.88
R7.2 Counseling reporting	7.2 Report counseling conclusion	743.80	12	Paper	61.98
R7.3 AER reporting	7.3 Report AER conclusion	22,136.33	85	Paper	260.43
R7.4 Medication error reporting	7.4 Report medication error conclusion	1,545.14	12	Paper	128.76
Total(Baht)		**24,855.83**			

Table 18, the AER reporting activity cost was the highest (22,136.33 Baht, 89.06% of this total activity pool cost) and the unit cost of this activity was 260.43 Baht. The lowest cost was the prescription reporting activity (430.56 Baht, 1.73% of this total activity pool cost) and the unit cost of this activity was 35.88 Baht.

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The results of unit cost of each activity are shown in Table 19.

Table 19 Unit cost of each activity in outpatient pharmacy dispensing service in Ladyao Hospital in the FY 2005

Activities	Amount	Output	Total cost (Baht)	Unit cost (Baht)
Pre-pack the pill and prepare the foiled drug				
- Pre-pack the pill	1,020	Time	46,105.94	45.20
- Prepare the foiled drug	144	Time	31,295.15	77.59
Preparation of equipments and place	365	Time	14,161.56	38.80
Arrangement of service time table	12	Paper	314.61	26.22
Preparation of the compounded drug	60	Time	43,494.79	724.91
Checking and withdrawing drug from the main stock	48	Time	6,966.70	145.14
Arrangement of drug stock	48	Time	11,873.44	247.36
Receive prescription and print the drug label	137,046	Prescription	494,354.91	3.61
Arrangement of drug dispensing	137,046	Prescription	292,738.96	2.14
Checking drug	137,046	Prescription	235,061.97	1.72
Dispensing	137,046	Prescription	10,608,141.59	77.41
Billing	58,500	Bill	421,005.06	7.20
Problem identification and provide counseling	115	Time	2,365.51	20.57
Become aware of and resolve AER	95	Case	2,012.05	21.18
Become aware of and resolve medication error	2,691	Time	8,705.47	3.24
Prescription reporting	12	Paper	430.56	35.88
Counseling reporting	12	Paper	743.79	61.98
AER reporting	85	Paper	22,136.33	260.43
Medication error reporting	12	Paper	1,545.14	128.76
Total (Baht)			**12,223,31.26**	

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The pharmacy dispensing service in outpatient unit includes dispensing service, counseling service, and AER service. The dispensing service cost composed of 4 activity pool costs from Table 19: the cost of preparation activity pool, withdrawn drug from the main stock activity pool, dispensing activity pool, and prescription reporting activity. This service cost was 11,764,817.91 Baht, unit cost was 85.85 Baht/ prescription or 19.10 Baht/ drug item. The unit cost of counseling service was 26.81 Baht/ time, which composed of counseling activity pool cost and counseling reporting activity cost. The unit cost of AER was 254.04 Baht/ case, which composed of AER activity pool cost and AER reporting activity cost. The other costs in outpatient pharmacy dispensing service such as the billing activity cost and detection medication error activity cost are also presented in Table 20.

Table 20 The unit cost of outpatient pharmacy dispensing services in Ladyao Hospital in the FY 2005

Services	Unit	Unit cost (Baht)
Outpatient dispensing	Prescription	85.85
Counseling	Time	26.81
AER	Case	254.04
Billing	Bill	7.57
Medication error	Time	3.75

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CHAPTER V
DISCUSSION

This study was aimed to analyze costs of pharmacy dispensing service activities in outpatient unit in Ladyao Hospital, Nakhonsawan Province during the FY 2005. There were 18 activities of outpatient pharmacy dispensing service which covering the 1st–5th standards of pharmaceutical services in hospital (The Pharmacy Council, and the Association of Hospital Pharmacy (Thailand), 2003: 134-141). Then, the discussion was divided into three parts as follows:

Part I: Activity dictionary

In this part, the activity dictionary was emphasized on time and output because they were the important efficiency and effectiveness indicators. Time spent on each activity revealed the waiting time on pharmacy service which was one of key performance indicators for quality of service (The Pharmacy Council and the Association of Hospital Pharmacy (Thailand), 2000: 78-81). In Ladyao Hospital, the target of pharmacy waiting time is not over 20 minutes/ prescription. This study indicated that time spent on dispensing activity pool was 19.69 minutes/ prescription. Therefore, the chiefs must concern with medication error which is a non-added value activity. The staff may lose their time to solve these problems average 4.19 minutes/ time in order to achieve the target. From the medication error report of pharmacy dispensing service in Ladyao Hospital during the FY 2005, there were 1.96% for medication error. This result was compared with the target which was not over 2% of all prescriptions, so the strategies for eliminating or reducing these errors were needed. Risk management should be used for examination cause of error and protection. The medication error reported most causes of medication error occurred from arrangement of a wrong drug and followed by input a wrong drug item of prescription to the computer. Moreover, on the rush hours for example, in the

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afternoon on diabetes mellitus clinic day or after long weekend, etc., there were the patients more than other days which affect to increase the waiting time, so the chiefs should provide the personnel to perform on those hours.

For the output, the ratio of outpatient prescriptions to number of pharmacists in most hospitals where had ever been studied in cost of pharmacy service are a general hospital such as Chonburi Hospital (Chetchotisakd, P., 1992), Sena Hospital (Thadtapong, K., 1998), and Chachoengsao Hospital (Rangpholsumrit, M., 1998). Workloads of pharmacist were high because of the large size of the hospital. This study was compared with 2 community hospitals, 60-beded, in Nakhonsawan Province. The result was presented that workload in Ladyao Hospital was the highest (Table 21) because there were 2 pharmacists who studied in post graduated program in the FY 2005. Ratio of the number of drug items to the prescriptions in Ladyao Hospital was high, similar to that in Nachuack Hospital where were the same community hospitals. From the pharmacy dispensing service chief interviewing to cause of this high ratio, it may result from various of drug utilization in the chronic diseases which often found in outpatient unit of Ladyao Hospital. In addition, the pharmacist's role in optimizing medication therapy which may reduce unnecessary drug items on the prescriptions were not seriously performed.

Table 21 Comparison of pharmacist's workload in Ladyao Hospital to other hospitals

Hospital (studied year)	**Beds**	**OPD Prescription (drug items : prescription)**	**No. of pharmacist**	**Ratio of prescriptions to pharmacist**
Ladyao (2005)	60	137,046 (4.49 : 1)	8	1,7131 : 1
Paisalee (2005)*	60	75,333 (NA)	5	1,5067 : 1
Takfa (2005)*	60	62,000 (NA)	4	15,500 : 1

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Table 21 Comparison of pharmacist's workload in Ladyao Hospital to other hospitals (continued)

Hospital (studied year)	Beds	OPD Prescription (drug items : prescription)	No. of pharmacist	Ratio of prescriptions to pharmacist
Chonburi (1991)	404	179,755 (2.10 : 1)	10	17,976 : 1
Sena (1997)	160	114,053 (3.07 : 1)	3	38,018 : 1
Chachoengsao (1998)	404	152,513 (2.87 : 1)	4	38,128 : 1
Nachuack (2005)	30	31,160 (3.66 : 1)	5	6,232 : 1

Remark: (NA) = Not Available

* = Data collection was done by an interview method

Part II: The total cost and activity costs of pharmacy dispensing service in outpatient unit:

1. Total cost of the outpatient pharmacy dispensing service in the Ladyao Hospital

Capital cost was the smallest portion because the pharmacy department was located at old building, thus depreciation cost was determined as one Baht. The smallest portion of capital cost was similar to that of the study in the Chonburi, Sena, Chachoengsao, and Lomkao crown prince Hospital (Assavasamrit, N., 1999). However, human investment capital cost in this year may increase higher than other years.

Percentage of material cost of pharmacy dispensing service in outpatient unit in the Ladyao Hospital was 85.39. It became the largest portion because the cost of drugs and medical supplies consumed 86.11% of total cost, which resulted from this service being the main function of pharmacy department and providing the medicine

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to all outpatients in responsible area of the Ladyao Hospital. These results were similar to the studies in the Chonburi, Sena, and Chachoengsao Hospitals. It was found that their costs of drugs and medical supplies were 87.42%, 83.45%, and 86.40% of total cost, respectively. If the administrators want to reduce the drug cost which is difficult to perform because of the Government Pharmaceutical Organization (GPO), competitive bidding, and group purchasing method restriction in Nakhonsawan Province. So, the strategies for saving the drug cost by improvement the process of purchasing, inventory and delivery drug were more realistic such as using computer technology, reducing inventory, increasing turnover rates, etc. In addition, increasing the role of optimizing medication therapy function correspondent to the 4th standard of the pharmaceutical services in pharmacy hospital to reduce unnecessary number of drug items on the prescription was another strategy for considering.

If the cost of drugs and medical supplies were excluded from total cost in this study, labor cost became as the largest portion was 60.89% of total cost similar to other studies (Assavasamrit, N., 1999; Intaraprasong, B., Kongsin, S., and Sumirattana, W., 2001; Tuisimma, J., 2005). Therefore, the administrators should give more attention to the labor cost because it possessed greater potential for saving than other costs and was controlled by human resource management.

2. Activity costs of the outpatient pharmacy dispensing service in the Ladyao Hospital

2.1 Total cost

These results were compared with the study in Nachauck Hospital because of using same ABC approach but the study in Nachauck Hospital was not included the cost of drugs and medical supplies. The similar results were that dispensing activity pool was the highest total cost, the second and third highest total cost activities were dispensing and billing activity. Difference in the highest total cost activity, arrangement of drug dispensing was the highest total cost because of the highest labor cost from the most staff to perform this activity in Nachuack Hospital study. For this study, receive the prescriptions and print the label of drugs was the highest because of the highest material cost for example, label sticker, prescription, and the container

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with protected from light, etc. The lowest total cost activity in Ladyao Hospital was the arrangement of service time table because of one person and less frequency to perform this activity.

2.2 Capital cost

The drug label printing activity of Nachauck Hospital was the highest capital cost because of using computer, printer, and air condition. Whereas, the highest capital cost activity of this study was the billing activity because the equipments were shared with other services in the pharmacy department, capital costs were allocated by proportion of work to outpatient pharmacy dispensing activities. So, the activity which has more output and time spent has more this cost. If time spent on these activities was reduced, cost would decrease. Billing activity took a long time to perform because this activity cost was calculated from the pharmacy staff sending the prescription to the financial staff until they call the patient's name and billing. There were 2 waiting times for the financial staff taking the prescription, and for the patient walking to the counter. Therefore, to reduce this activity cost, decreasing the waiting time of service such as using printing bill technology to reduce the writing time should be considered.

2.3 Labor cost

Comparison labor cost in this study with the study in Nachuack Hospital, the third labor cost activities were similar but different in the highest labor cost. The study in Nachuack Hospital, the highest was the arrangement of drug dispensing activity because 2 staff performed in this activity which used more staff than other activities. In this study, the highest labor cost was dispensing activity because of the labor cost of pharmacists. The pharmacists were only persons having authority in drug dispensing and possessing the highest labor cost in the pharmacy department. In addition, sometimes 3 pharmacists were used for dispensing if there were many patients.

In this study, 14 activities from 18 activities possessed the highest labor cost portion (4 activities possessed the highest portion as the material cost). Therefore, to reduce the labor cost, 2 issues were discussed as follows:

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1. Activities uncontrolled the high labor cost: these activities use the professional knowledge and skill of work to perform (arranged from highest to lowest labor cost) such as:

- Dispensing and advising activity
- Billing activity
- Checking drug activity
- AER reporting activity
- Becoming aware of and resolve medication error activity
- Checking and withdrawn drug from the main stock
- Becoming aware of and resolve AER

2. Activities controlled by cost management strategy (arranged from highest to lowest labor cost) such as:

Arrangement of drug dispensing activity was high proportion labor cost resulting from time spent in this activity. The time spent was varied, depending on individual work skill and amount of drug in each prescription. Skill training and providing the appropriate work area and supplies for all staff may reduce this activity cost.

Pre-package the pill and preparing the foiled drug activity was high proportion of labor cost because there are many steps for production. This study did not include the step of pre-pack checking by pharmacists because of no record data. The pharmacist who purchased drug of the hospital should compare the pre-pack the pill cost with the foiled drug cost which may have equal cost and more protect the quality of drug.

Arrangement of drug stock activity was high proportion of labor cost due to long time spending for delivery and arranging drug. The administrations should consider using the facilities such as the vehicle for delivery, etc.

Arrangement of service time table, medication error reporting, counseling reporting, and prescription reporting activity were high proportion of labor cost because of the labor cost of pharmacists and senior pharmacy technician. The administrators may consider for training other staff for replacement.

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2.4 Material cost

The cause of high material cost in each activity to control this cost should be re-considered. Activities consuming high material costs were dispensing activity, followed by receive the prescriptions and print the label of drug, preparation of the compounded drug, and preparation of the equipments and place activity.

2.5 Other costs

The electricity cost was the highest portion of utility cost (97.84% of utility cost). The administers may reduce this cost by reducing electricity used for example, turning off the computer in the afternoon, turning off the air condition 1 hour before work finished, and buying the save energy electric at instruments.

2.6 Unit cost

The unit cost of outpatient pharmacy dispensing service in Ladyao Hospital when excluded drugs and medical supplies cost was 2.62 Baht/ drug item or 11.76 Baht/ prescription, whereas in the study of Nachauck Hospital was 6.30 Baht/ drug item or 23.61 Baht/ prescription. The higher unit cost of Nachauck Hospital's study was due to the different activities. This result cannot be absolutely compared with that of other hospitals because type of hospital and the activities to study are different. This is a need for ABC studies in another hospital to fully assess the cost of each type of hospital.

Part III: The strengths and weakness of this study

The strengths of the study were as follows:

1. Data collecting were not difficult for the researcher to perform due to a good co-operation from the administrators and staff in Ladyao Hospital. This well co-operation leads to enhance more reliable of data to obtain.

2. Some data were absolutely completely collected because the administrators of Ladyao Hospital prepared on the system to serve for cost analysis, for example, details of data on equipment and drug utilization.

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3. This initiative project for further studies is appropriate for the hospital that never used ABC system because:

3.1 This ABC system did not make any changes in the organization system, less negative reaction from the staff.

3.2 The administrations and staff will confide in this system when expand to use the results in future.

3.3 The strengths and weakness in this study recommended as a guideline to further implementation to over all organization system.

4. Activity-based costing in this study was not only limited to cost alone but also include performance measures. Activity cost and performance data provide information for hospital management to determine the effectiveness and efficiency of service, facilitating elimination of non-value added activities, and improve process.

The weakness of the study:

1. This study was activity-based costing in only one service of the pharmacy department, so cost of water supply was estimated from the hospital.

2. Time spent in each activity was estimated using the self-administered method. The researcher observed some performances for one week to confirm these data, so it is impossible to cover all activities.

3. This study was a retrospective study, some activities not able to be analyzed because the data were incomplete and obtained by recall memory, for example the outputs of pre-packing the pill and preparing the foiled drug.

4. The implementation system of ABC is costing, complicated, and time consuming method.

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CHAPTER VI
CONCLUSION AND RECOMMENDATIONS

To compete in the changing health care environment, the hospital must develop an information system that provides the financial and non-financial feedback in supporting of more advanced cost management methods. The ABC becomes as an alternative tool for administrators to use for efficient resource management and to improve the service quality. This study was proposed by activity based approach to analyze costs of pharmacy dispensing service activities in outpatient unit in Ladyao Hospital, Nakhonsawan Province by using both primary and secondary sources of data. The results and implications of this study can be generalized to other pharmacy and departmental services in Ladyao Hospital. In addition, it was also implied to other health care facilities.

Conclusion of the study

The analysis process of activity-based costs of the outpatient pharmacy dispensing unit in this study was summarized as follows: firstly, the activity dictionary of the pharmacy dispensing service in outpatient unit was obtained from using self-administrated questionnaires. Apart from these, an additional needed data were obtained from interviewing the pharmacy and financial staff. After that, secondary data were collected by using record forms (C2-8). Then, the cost was allocated to each activity by an appropriate resource driver. And, the cost was allocated again by activity driver to the cost objective. Finally, unit cost of sub-activity was computed by dividing total sub-activity cost to output of each sub-activity. Cost of each activity was calculated by the summarized cost of all sub-activities in that activity.

In this study, it was found that the outpatient pharmacy dispensing service in the Ladyao Hospital was identified into 18 activities and 40 sub-activities which were

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classified to 7 activity pools such as 1) preparation, 2) drug withdrawing, 3) dispensing, 4) counseling, 5) AER, 6) medication error, and 7) reporting.

Cost of pharmacy dispensing service in outpatient unit, Ladyao Hospital in the FY 2005.

1. Total cost of pharmacy dispensing service in outpatient unit, FY 2005 was 12,223,331.27 Baht which was composed of 96.46% of recurrent cost and 3.54% of capital cost.

2. The capital cost was 432,768.21 Baht which was composed of human investment capital cost and the depreciation cost of equipments accounted for 56.98% and 43.02% of capital cost, respectively.

3. The recurrent cost was 11,790,563.08 Baht which was composed of labor cost, material cost and other costs accounted for 10.69%, 88.52%, and 0.79% of recurrent cost, respectively.

The percentages of capital cost, labor cost, material cost, and other costs were 3.54, 10.31, 85.39, and 0.76 of total cost, respectively.

4. The activity cost

4.1 The third highest total cost activities were dispensing (86.79%of total cost) with greater than the receive prescription and print the label of drug (4.04% of the total cost) and billing activity (3.44% of total cost).

4.2 The third highest capital cost activities were billing (29.29% of capital cost) with greater than the dispensing (18.56% of capital cost) and the arrangement of drug dispensing (18.25% of capital cost).

4.3 The third highest labor cost activities were dispensing (30.30%of labor cost) with greater than the billing activity (19.22% of labor cost) and arrangement of drug dispensing (14.96% of labor cost).

4.4 The third highest material cost activities were dispensing (97.04% of material cost) with greater than the receive prescription and print the label of drug (2.31% of material cost) and the preparation of the compounded drug (0.37% of material cost).

4.5 The third highest other cost activities were billing (29.29% of other costs) with greater than the dispensing (18.56% of other costs) and the arrangement of drug dispensing (18.25% of other costs).

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Material cost was the largest proportion occurring from the high cost of drugs and medical supplies (83.06% of total cost), because this service provides drugs to all outpatient in responsible area of Ladyao Hospital. Therefore, this cost was not the main factor for pharmacy dispensing service improvement. If this cost were excluded, total cost was 2,070,029.97 Baht and the percentages of capital cost, labor cost, material cost and operating cost were 20.91, 60.89, 13.73 and 4.47 of total cost, respectively. Labor cost became the highest proportion resulting in order of the highest activity cost changed in total cost and material cost including:

1. The third highest total cost activities were receiving prescription and printing the label of drug (23.88% of total cost) with greater than the dispensing (23.60%of total cost) and the billing (20.34% of total cost).

2. The third highest material cost activities were receiving prescription and printing the label of drug (78.10% of material cost) with greater than the billing (8.76% of material cost) and the preparation of compounded drug (3.18% of material cost).

These results indicated that the administrators should concern with the real cost driver such as labor cost and material cost by managing human resources especially time spent in each activity which was activity driver for labor cost and the activities which consumed high material cost such as receiving prescription and printing the label of drug activity.

5. Unit cost analysis of the pharmacy dispensing service in outpatient unit includes: 1) dispensing service 85.85 Baht/ prescription or 19.10 Baht/ drug item. If drug and medical supply cost was excluded, unit cost was 11.76 Baht/ prescription or 2.62 Baht/ drug item, 2) counseling service 26.81 Baht/time, 3) AER service 254.04 Baht/ case, and other services such as the billing 7.57 Baht/ bill, detection medication error 3.75 Baht/time.

Recommendations

The hospital policy was emphasized on the service quality and the utilization of the limited resources at the highest efficiency for the organization and clients, so the

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cost information for serving the financial and performance management are necessary for every hospital services.

1. Recommendation from findings

1.1 The main factor in outpatient pharmacy dispensing service is the labor cost and that it should be re-considered to save in this cost.

1.2 Data collection was found that some activities in outpatient pharmacy dispensing service were not recorded such as drug interaction activity, pre-packaging activity, and prescription error activity. Some activities were under record such as pre-packing the pill and preparing the foiled drug activity, which were an underestimated cost. It is recommended that the data should be recorded systematically and consistently.

1.3 The method of ABC in this study is useful for administrators to understand what are the causes of cost through the cost drivers and how to evaluate and to improve it.

1.4 ABC would not be well function if the data utilization was not applicable to improve the process. Therefore, this study was not only analyzed the activity cost and the output but also tried to indicate the association with cost information and key performance indicators of service.

1.5 Some data using computer technology such as cost data on equipments and drug utilization were easy to collect. However, drug utilization data were complicated to compute the cost because the program did not serve for any cost analysis. Therefore, program served activity based costing and adapted to overall organization was recommended.

1.6 ABC implementation is costing, complicated, and time consuming method. So, the administrators and researcher need to re-consider in comparing with benefit and costing before implement this system.

2. Recommendation for further study

2.1 Using the observational method to confirm the data and more cover the interesting activities, but the researcher cannot observe in every activity because the more activities are the more complexity, having some expenditure, and time spent on study. Therefore, it should be considered with the study objective, limitation, and

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methodology by chosen observation especially in the main activities. Moreover, caution of observational method is bias causing from the staff who would feel uncomfortable like they are being watched by the researcher. This may affect them to aware their behavior and perform in the way to increase more efficiency work.

2.2 The interview process should be carefully performed. The understandable questions, appointment on the free time or convenience time of interviewees should be considered and well planned. In addition, it is essential to ask for permission from the staffs in every visit.

2.3 The results and implementation from this study can be generalized to other pharmacy services, for example inpatient pharmacy service, pharmaceutical care, and drug stock procurement, etc. and to other services or treatment in the hospital.

2.4 Comparison of billing activity costs in UC and non-UC were recommended for the further studies.

2.5 Prospective study should be conducted for further study in order to obtain more accurate data.

2.6 Activity cost analysis should be continuously to perform at least 3 fiscal years in order to understand cost behavior and its pattern that can be implied to study among other hospitals for better comparison.

2.7 Cooperation of administrators and staffs are necessary to implementation ABC. Therefore, the researcher should have good relationship and often re-consider some data with them.

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BIBLIOGRAPHY

ENGLISH

Baker, J. J. (1998). Activity-based costing and activity-based management for health care. Maryland: Aspen Publishers, Inc.

Brimson, J. A. (1997). Activity accounting: An activity-based costing approach. United States of America: John Wiley & Sons, Inc.

Cokins, G. (2001). Activity-based cost management: An executive's guide. United States of America: John Wiley & Sons, Inc.

____. (1996). Activity-Based cost management: Making it work. United States of America: The McGraw-Hill companies, Inc.

Creese, A., & Parker, D. (2000). Cost analysis in primary health care: A training manual for programme managers. Geneva: WHO

Devine, K., O'clock, P. & Lyons, D. (2000). Health-care financial management in a changing environment. Journal of business research, 48 (3), 183-191.

Drummond, M. F., O'Brien, B. J., Stoddart G. L., & Torrance G. W. (1997). Method for the economic evaluation of health care programmes. Oxford: Oxford University Press.

Jacobs, P., & Rapoport, J. (2002). The economic of health and medical care. (5th ed.). Maryland: Aspen Publishers, Inc.

Jhukrit Tuisimma. (2005). Unit cost of outpatient Pharmacy service at Nachuack Hospital: A comparison between Activity-Based Costing and IHPP costing guideline. Degree of master of science in health product management, Khon Kaen University.

Kamolwan Thadtapong. (1998). Unit cost analysis of pharmacy services at Senna Hospital, Ayutthaya during FY 1997. Degree of master of science in pharmacy (pharmacy administration) faculty of graduate studies Mahidol University.

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Manee Rangpholsumrit. (1998). Unit cost of pharmacy services in 1998 at Chachoengsao hospital. Degree of master of science in pharmacy (hospital pharmacy) faculty of graduate studies Mahidol University.

Mclean, R.A. (2003). Financial management in health care organization. (2nded.). Canada: Delmar Learnind, a division of Thomson Learning, Inc.

Miller, J. A. (1996). Implement activity-based management in daily operations. United States of America: John Wiley & Sons, Inc.

Nampet Assavasamrit.(1999). Unit cost of outpatient and inpatient services at Lomkao prince hospital, Petchaboon province fiscal year 1998. Degree of master of science in pharmacy (hospital pharmacy) faculty of graduate studies Mahidol University.

Pasara Chetchotisakd. (1992). Unit cost of Pharmacy department of Chonburi Hospital in Fiscal year 1991. Degree of master of public health administration faculty of graduate studies Mahidol University.

Richard, D. I. (1996). Activity-Based Cost Management making it work. A Times Mirror Higher Education group, Inc. company.

Taehan Kanho Hakhoe Chi. (2004). Cost analysis of home care with activity-based costing (ABC). Journal of Public Health Medicine Oct.;34 (6), 1,117-28.

Van Zanten, A., et al. (2003). Importance of nondrug costs of intravenous antibiotic therapy [Online]. Available: http://www. scirus.com [2006, Jan. 26].

Wannaporn Sopanna. (2004). Prevention and promation activities-based costing of primary care unit: A case study of Salalumduan, Sakaeo province, Thailand. Degree of master of primary health care management faculty of graduate studies Mahidol University.

ภาษาไทย

การไฟฟ้าส่วนภูมิภาค. วิธีคิดค่าไฟฟ้าสำหรับหน่วยงานราชการ [Online]. Available: http://www.pea.co.th/rates/rates_of_government.htm/ [2005, Oct 30].

เจริญศรี มิตรภานนท์, ศุภวัลย์ พลายน้อย, และลิขสิทธ์ วงศ์ศรศักดิ์. (2542). ABC: Activity-Based costing (การบริหารต้นทุนตามกิจกรรม) แนวทางการประยุกต์ใช้โมเดล ABC ในการวิเคราะห์ต้นทุนของกิจกรรมการสอนของมหาวิทยาลัยมหิดล. โครงการพัฒนาและเตรียมผู้บริหารรัฐกิจ (mini MPA)รุ่นที่ 12 พ.ศ. 2542 มหาวิทยาลัยมหิดล.

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ชัยสิทธิ์ เฉลิมมีประเสริฐ. (2544). ความพร้อมของหน่วยงานภาครัฐในการบริหารจัดการระบบงบประมาณแบบมุ่งเน้นผลงานตามยุทธศาสตร์ชาติ(Strategic Performance Based Budgeting: SPBB) และกรณีตัวอย่างกรมควบคุมโรค กระทรวงสาธารณสุข. (พิมพ์ครั้งที่ 2). กรุงเทพฯ: บริษัท ธนรัชการพิมพ์ จำกัด.

นุศราพร เกษสมบูรณ์, เปรมใจ สัจจะอารีวัฒน์, และวรรณี ชัยเฉลิมพงษ์. (2548). เครื่องมือวิเคราะห์ต้นทุนและการเงินเพื่อตัดสินใจลงทุน (Cost analysis and financial investment decision toolbox). การประชุมวิชาการเชิงปฏิบัติการ เรื่อง การวิเคราะห์ต้นทุนและการวิเคราะห์ทางการเงินเพื่อการตัดสินใจลงทุน วันที่ 22- 26 สิงหาคม 2548.

ปิยธิดา ตรีเดช. (2547). ซีเอฟโอมือขวาผู้ว่าซีอีโอ. (พิมพ์ครั้งที่ 1). กรุงเทพฯ

ผกาวดี ละอองเกียรตินันท์. (2543). การวิเคราะห์ต้นทุนต่อหน่วยบริการจำแนกตามกิจกรรมการบริการของสถานีอนามัย สังกัดสำนักงานสาธารณสุขกิ่งอำเภอบางเสาธง จังหวัดสมุทรปราการ ปีงบประมาณ 2541. วิทยานิพนธ์ปริญญาวิทยาศาสตรมหาบัณฑิต(สาธารณสุขศาสตร์) , ภาควิชาบริหารงานสาธารณสุข บัณฑิตวิทยาลัย มหาวิทยาลัยมหิดล.

ฝ่ายเภสัชกรรมชุมชน โรงพยาบาลลาดยาว. (2547). รายงานผลการปฏิบัติงานฝ่ายเภสัชกรรมชุมชน โรงพยาบาลลาดยาว ปีงบประมาณ 2547. นครสวรรค์: โรงพยาบาลลาดยาว.

ภิรมย์ กมลรัตนกุล. (2543). หลักและการประยุกต์เศรษฐศาสตร์สาธารณสุขสำหรับผู้บริหาร. กรุงเทพฯ: โรงพิมพ์สถาบันพัฒนาการสาธารณสุขอาเซียน มหาวิทยาลัยมหิดล.

ภูษิตา อินทรประสงค์, สุคนธา คงศีล, และวรรณภา สุมิรัตนะ. (2545). รายงานผลการวิจัย: การวิเคราะห์ต้นทุนการผลิตบัณฑิต ปีการศึกษา 2544 คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล.

วรศักดิ์ ทุมมานนท์. (2544). ระบบการบริหารต้นทุนกิจกรรม: Activity based costing: ABC. (พิมพ์ครั้งที่ 1). กรุงเทพฯ: สำนักพิมพ์ไอโอนิค.

ศุภสิทธิ์ พรรณนารุโณทัย. (2544). ต้นทุนของบริการสาธารณสุข ในยุคปฏิรูประบบสุขภาพ. (พิมพ์ครั้งที่ 2). กรุงเทพฯ: หจก.สุรสีห์กราฟฟิค.

สภาเภสัชกรรม, สมาคมเภสัชกรรมโรงพยาบาล (ประเทศไทย) และกลุ่มงานเภสัชกรรม กองโรงพยาบาลภูมิภาค. (2546). มาตรฐานเภสัชกรรมโรงพยาบาล (ระยะสอง) พ.ศ. 2546-2548. ใน, สู่ปีที่ 9 สภาเภสัชกรรม. (134-141). กรุงเทพฯ: สุรพิมพ์ จำกัด.

สภาเภสัชกรรม, สมาคมเภสัชกรรมโรงพยาบาล (ประเทศไทย), และกลุ่มงานเภสัชกรรม กองโรงพยาบาลภูมิภาค. (2543). เส้นทางสู่คุณภาพบริการเภสัชกรรม. (พิมพ์ครั้งที่ 2). กรุงเทพฯ: อาร์ ดี พี.

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สมคิด แก้วสนธิ และภิรมย์ กมลรัตนกุล. (2534). เศรษฐศาสตร์สาธารณสุข: การวิเคราะห์และประเมินผลบริการสาธารณสุข. (พิมพ์ครั้งที่ 1). กรุงเทพฯ: โรงพิมพ์จุฬาลงกรณ์มหาวิทยาลัย.

สมชาติ โตรักษา. (2546) กลยุทธ์การบริหารโรงพยาบาลเพื่อการพัฒนาที่ยั่งยืน. (พิมพ์ครั้งที่ 1). กรุงเทพฯ: หจก. พี. เอ็น. การพิมพ์.

สำนักงบประมาณและภาควิชาการบัญชี คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย. (2544). คู่มือการคำนวณต้นทุนฐานกิจกรรมสำหรับสถาบันการศึกษาจำลอง. กรุงเทพฯ: คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย.

สำนักงานปลัดกระทรวงสาธารณสุขและสำนักงานคณะกรรมการข้าราชการพลเรือน. วิเคราะห์และกำหนด โครงสร้างการแบ่งงานภายในและอัตรากำลังของหน่วยงานในภูมิภาค[Online]. Available: http://www.moph.go.th/about/structure/[2005, Nov.15].

อนุวัฒน์ ศุภชุติกุล, อดิศวร์ หลายชูไทย, วิโรจน์ ตั้งเจริญเสถียร, และสุกัลยา คงสวัสดิ์. (2539). ความรู้เบื้องต้นในการวิเคราะห์ต้นทุนของสถานบริการสาธารณสุข. วิทยาลัยการสาธารณสุข จุฬาลงกรณ์มหาวิทยาลัย และสถาบันวิจัยระบบสาธารณสุข.

อาทร ริ้วไพบูลย์. (2544). การวิเคราะห์ต้นทุนในการดูแลสุขภาพ. คณะเภสัชศาสตร์ มหาวิทยาลัยมหิดล.

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APPENDIX

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No. MU 2006-010

Documentary Proof of Ethical Clearance
The Committee on Human Rights Related to Human Experimentation
Mahidol University, Bangkok

Title of Project: Activity-Based Costing of Pharmacy Dispensing Service in Outpatient Unit in Ladyao Hospital, Nakhonsawan Province
(Thesis for Master Degree)

Principle Investigator: Miss Thippawan Methacanon

Name of Institution: Faculty of Public Health

Approved by the Committee on Human Rights Related to Human Experimentation

Signature of Chairman: .....
(Professor Dr.Srisin Khusmith)

Signature of Head of the Institute: .....
(Professor Dr.Pornchai Matangkasombut)

Date of Approval: 26 JAN 2006

Date of Expiration: 25 JAN 2007

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C1: Activity dictionary

Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
1. Preparation	P1.1	Pre-pack the pill and prepare the foiled drug	1.1.1 Prepare the label of pre-pack drug	P2, P3	492	Time
			1.1.2 Pre-pack the pill	P2, P3	1,020	Time
			1.1.3 Record the pre-package	P2, P3	528	Time
			1.1.4 Prepare the foiled drug	P2, P3	144	Time
	P1.2	Preparation of equipments and place	1.2.1 Prepare and/or arrange the equipment	P2, P3	365	Time
			1.2.2 Clean room and others e.g., counter, shelves etc.	P2, P3	365	Time
	P1.3	Arrangement of service time table	1.3 Arrange service time table	P1	12	Paper
	P1.4	Preparation of the compounded drug	1.4.1 Calculate and prepare the compounded drug	P1, P2	60	Time
			1.4.2 Move and arrange the compounded drug on the pharmacy dispensing shelves	P2	60	Time

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C1: Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
3. Dispensing (continued)	D3.1	Receive prescription and print the drug label (continued)	3.1.3 Conclude the expenditure and print the prescription and labels of drug	P2, P3	137,046	Prescrip-tion
			3.1.4 Stick the labels and put them into the drug basket	P2, P3	137,046	Prescrip-tion
	D3.2	Arrangement of drug dispensing	3.2.1 Arrange drug	P2, P3	137,046	Prescrip-tion
			3.2.2 Drug arranger sings in and form queue	P2, P3	137,046	Prescrip-tion
	D3.3	Checking drug	3.3.1 Check drug	P1	137,046	Prescrip-tion
			3.3.2 Form the queue again	P1	137,046	Prescrip-tion

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C1: Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
3. Dispensing (continued)	D3.1	Receive prescription and print the drug label (continued)	3.1.3 Conclude the expenditure and print the prescription and labels of drug	P2, P3	137,046	Prescrip-tion
			3.1.4 Stick the labels and put them into the drug basket	P2, P3	137,046	Prescrip-tion
	D3.2	Arrangement of drug dispensing	3.2.1 Arrange drug	P2, P3	137,046	Prescrip-tion
			3.2.2 Drug arranger sings in and form queue	P2, P3	137,046	Prescrip-tion
	D3.3	Checking drug	3.3.1 Check drug	P1	137,046	Prescrip-tion
			3.3.2 Form the queue again	P1	137,046	Prescrip-tion

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C1: Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
3. Dispensing (continued)	D3.4	Dispensing	3.4.1 Double check drug	P1	137,046	Prescrip-tion
			3.4.2 Dispense and advice	P1	137,046	Prescrip-tion
			3.4.3 Classify the prescription according to the patient's right	P1	137,046	Prescrip-tion
	D3.5	Billing	3.5.1 Send the prescription to the financial personnel	P2	58,500	Bill
			3.5.2 Call the patient's name and bill	F	58,500	Bill
4. Counseling	C4.1	Problem identification and provide counseling	4.1.1 Meet and take the patient to the counseling room	P1	115	Time
			4.1.2 Examine the medication history of patient	P1	115	Time

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C1: Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
4. Counseling (continued)	C4.1	Problem identification and provide counseling	4.1.3 Counseling	P1	115	Time
			4.1.4 Conclude and record counseling	P1	115	Time
5. Averse Event Reaction(AER)	A5.1	Become aware of and resolve AER	5.1.1 Meet uncertain AER case	P1	95	Case
			5.1.2 Examine the history of patient and assess symptom	P1	95	Case
			5.1.3 Conclude, record and/or give AER card	P1	95	Case
6. Detection medication error	M6.1	Become aware of and resolve medication error	6.1.1 Check and classify medication error	P1	2,691	Time
			6.1.2 Resolve medication error	P1	2,691	Time
			6.1.3 Record medication error	P1	2,691	Time

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C1: Activity dictionary (continued)
Pharmacy dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province during the FY 2005

Activity Pools	Code	Activities	Sub-activities	Cooperate	Amount	Output
7. Reporting	R7.1	Prescription reporting	7.1 Count the prescription and calculate the expenditure of treatment	P2, P3	12	Paper
	R7.2	Counseling reporting	7.2 Report counseling conclusion	P1	12	Paper
	R7.3	AER reporting	7.3 Report AER conclusion	P1	85	Paper
	R7.4	Medication reporting	7.4 Report medication error conclusion	P1	12	Paper

Remark: P1 = Pharmacist
P2 = Pharmacy technician
P3 = Pharmacist assistant
F = Financial staff

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C2 : Depreciation of building recording form

Ladyao Hospital, Nakhonsawan Province

Fiscal year 2005

Data collecting dated: Febuary 7, 2006

OPD building:

Construction year 1980-1982 Price 14,900,000 Baht

**Expired building was valueless because depreciation settlement is 20 years for building. Therefore, depreciation of OPD building was excluded in this study.

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C3 :Depreciation of equipment recording form

Dispensing service in outpatient unit, Pharmacy department of Ladyao Hospital, Nakhonsawan Province in the FY 2005

No.	Items	Quan-tity	Price/unit	Date/month/year received	Time used(yr)	Useful life(yr)	Depreciation/yr	Residual value(Baht)	Annual cost(Baht)	Total(Baht)
1	Refrigerator+Controller	1	22,000.00	19 Dec 03	2	5	4,400.00	8,800.00	6,600.00	6,600.00
2	Air filter	1	20,900.00	25 Feb 05	0	5	4,180.00	0.00	20,900.00	20,900.00
3	Telephone	1	3,990.00	14 Nov 05	0	5	798.00	0.00	3,990.00	3,990.00
4	Digital camera	1	7,960.00	14 Jun 05	0	5	1,592.00	0.00	7,960.00	7,960.00
5	Cabinet	1	4,800.00	5 Feb 04	1	5	960.00	960.00	3,840.00	3,840.00
6	Computer 32 Bit	3	32,000.00	16 Jun 01	4	5	6,400.00	25,600.00	1,600.00	4,800.00
7	Computer 32 Bit	2	27,000.00	1 Aug 00	5	5	5,400.00	27,000.00	1.00	1.00
8	Computer Pentium 4	2	26,290.00	1 Aug 05	0	5	5,258.00	0.00	26,290.00	52,580.00
9	Notebook Pentium 4	1	34,500.00	20 Jun 05	0	5	6,900.00	0.00	34,500.00	34,500.00
10	Dot Matrix Printer	1	8,900.00	17 Oct 01	4	5	1,780.00	7,120.00	445.00	445.00
11	Dot Matrix Printer	1	6,800.00	17 Oct 01	4	5	1,360.00	5,440.00	340.00	340.00
12	Dot Matrix Printer	1	8,500.00	16 Jun 04	1	5	1,700.00	1,700.00	6,800.00	6,800.00
13	Injek Printer	1	5,200.00	19 Sep 05	0	5	1,040.00	0.00	5,200.00	5,200.00
14	Dispensing counter	1	127,374.00	24 Jul 03	2	5	25,474.80	50,949.60	38,212.20	38,212.20
Total(Baht)										186,168.20

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C4.1: Labor cost recording form

Dispensing service in outpatient unit, Pharmacy departmentof Ladyao Hospital, Nakhonsawan Province in the FY 2005

Civil Servants

No.	Code	Salary	Position allowance	Added benefit	Medical fee	Overtime payment	Training/seminar	Total(Baht)
1	A1	184,680.00	42,000.00	0.00	1,450.00	36,000.00	0.00	264,130.00
2	A2	150,240.00	0.00	60,000.00	8,746.00	48,000.00	10,826.00	277,812.00
3	A3	143,100.00	0.00	0.00	16,340.00	45,000.00	1,413.00	205,853.00
4	A4	132,660.00	0.00	60,000.00	3,395.00	45,000.00	2,630.00	243,685.00
5	A5	122,220.00	0.00	60,000.00	30,073.00	44,400.00	7,324.00	264,017.00
6	A6	115,740.00	0.00	60,000.00	6,230.00	43,800.00	0.00	225,770.00
7	A7	79,400.00	0.00	60,000.00	0.00	42,000.00	0.00	181,400.00
8	A8	81,150.00	0.00	60,000.00	2,060.00	44,400.00	4,593.00	192,203.00
9	B1	186,900.00	0.00	0.00	28,101.00	38,000.00	0.00	253,001.00
10	B2	182,940.00	0.00	0.00	6,745.00	47,200.00	2,592.00	239,477.00
Total(Baht)		1,379,030.00	42,000.00	360,000.00	103,140.00	433,800.00	29,378.00	2,347,348.00

Government Employee

No.	Code	Wage	Overtime payment	Total(Baht)	No.	Code	Wage	Overtime payment	Total(Baht)
11	B3	80,520.00	28,000.00	108,520.00	15	C3	44,400.00	27,250.00	71,650.00
12	B4	71,040.00	26,800.00	97,840.00	16	C4	44,400.00	20,750.00	65,150.00
13	C1	115,740.00	21,500.00	137,240.00	17	D1	63,120.00	4,800.00	67,920.00
14	C2	44,400.00	23,750.00	68,150.00	18	D2	-	196,400.00	196,400.00
Total(Baht)							463,620.00	349,250.00	812,870.00

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C4.2: Working time recording form

Dispensing service in outpatient unit, Pharmacy department
Ladyao Hospital, Nakhonsawan Province
Fiscal year 2005

Code of personnel	Workday (hr)	Weekend (hr)	Working time (hr)
A1	1,652	480	2,132
A2	1,533	640	2,173
A3	1,624	600	2,224
A4	1,603	600	2,203
A5	1,645	592	2,237
A6	1,526	584	2,110
A7	1,575	560	2,135
A8	1,649	592	2,241
B1	1,533	760	2,293
B2	1,631	944	2,575
B3	1,582	560	2,142
B4	1,533	536	2,069
C1	1,572	688	2,260
C2	1,593	760	2,353
C3	1,505	872	2,377
C4	1,586	664	2,250
D1	1,610	96	1,706
D2	-	3,928	3,928
Total(hr)	26,952	10,528	41,408

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C4.3: Proportion of time spent recording form

Dispensing service in outpatient unit, Pharmacy department

Ladyao Hospital, Nakhonsawan Province

Fiscal year 2005

Code of person-nel	Workday(hr)		Weekend(hr)		Time spent on outpatient dispensing service (hr/yr)	Working time (hr/yr)	Proportion of time spent on outpatient dispensing service(%)
	Working time OPD/wk	Working time OPD/yr	Working time OT/yr	Working time OPD/yr			
A1	7.00	336	480	240	576	2,132	27.02
A2	10.50	504	640	320	824	2,173	37.92
A3	5.25	252	600	300	552	2,224	24.82
A4	14.00	672	600	300	972	2,203	44.12
A5	8.75	420	592	296	716	2,237	32.01
A6	7.00	336	584	292	628	2,110	29.76
A7	10.50	504	560	280	784	2,135	36.72
A8	7.00	336	592	296	632	2,241	28.20
B1	15.75	756	760	380	1,136	2,293	49.54
B2	8.75	420	944	472	892	2,575	34.64
B3	10.50	504	560	280	784	2,142	36.60
B4	19.25	924	536	268	1,192	2,069	57.61
C1	21.00	1,008	688	344	1,352	2,260	59.82
C2	24.50	1,176	760	380	1,556	2,353	66.13
C3	17.50	840	872	436	1,276	2,377	53.68
C4	15.75	756	664	332	1,088	2,250	48.36
D1	1,610	1,288	96	96	1,384	1,706	81.13
D2	-	-	3,928	3,928	3,928	3,928	100.00

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C5 : Drug and medical supply cost recording form

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
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No.	Item	Unit	Amount	Price	Total(Baht)
1	Acetylcysteine 200 mg	sachet	45,629	1.32	60,230.28
2	Actifed syrup	bottle	975	6.00	5,850.00
3	Actifed tablet	tablet	71,853	0.31	22,274.43
4	Activated charcoal	sachet	1	50.00	50.00
5	Acyclovir 200 mg tablet	tablet	7,177	1.37	9,832.49
6	Artificial tear	bottle	115	26.75	3,076.25
7	Albendazole 200 mg tablet	tablet	274	3.80	1,041.20
8	Ethyl alcohol 30 ml	bottle	144	3.75	540.00
9	Ethyl alcohol 450 ml	bottle	155	28.00	4,340.00
10	Allupurinol 100 mg tablet	tablet	59,970	0.50	29,985.00
11	Alprazolam 0.25 mg	tablet	1,760	0.44	774.40
12	Ambroxol 30 mg	tablet	171,751	0.22	37,785.22
13	Amitriptyline 10 mg	tablet	33,437	0.18	6,018.66
14	Amitriptyline 25 mg	tablet	24,461	0.37	9,050.57
15	Amlodipine 10 mg	tablet	97,690	5.00	488,450.00
16	Amlodipine 5 mg	tablet	113	5.00	565.00
17	Ammonium carbonate 180 ml	bottle	140	19.00	2,660.00
18	Amoxycillin syrup	bottle	2,991	14.00	41,874.00
19	Amoxycillin 250 mg	capsule	25,361	1.05	26,629.05
20	Amoxycillin 500 mg	capsule	93,954	1.70	159,721.80
21	Amoxycillin 250 mg+clavulanate 125 mg	tablet	477	9.80	4,674.60
22	Amoxycillin 875 mg+clavulanate 125 mg	tablet	6,124	19.00	116,356.00
23	Ampicillin 500 mg	vial	12	10.00	120.00
24	Ampicillin 1 g	vial	15	12.00	180.00
25	Antazaline eye drop	bottle	3,666	13.91	50,994.06
26	Antacid suspension 240 ml	bottle	8,501	20.00	170,020.00
27	Antacid tablet	tablet	1,460	0.24	350.40
28	Antirabies	vial	437	720.00	314,640.00
29	Aspirin 60 mg	tablet	216,682	0.10	21,668.20
30	Aspirin 300 mg	tablet	151,115	0.23	34,756.45
31	Atropine inj.	ampule	70	2.25	157.50
32	Beclomethasone inhaler	bottle	3	190.00	570.00
33	Beradual solution	bottle	2	214.00	428.00
34	Betamethasone cream	tube	1,698	12.89	21,887.22
35	Betamethasone + salicylic	tube	10	18.00	180.00
36	Betahistine 6 mg	tablet	2,870	0.53	1,521.10
37	Bisacodyl 5 mg	tablet	2,180	0.15	327.00
38	Bromhexine syrup	bottle	1,945	5.80	11,281.00
39	Brown mixture 60 ml	bottle	3,556	8.00	28,448.00
40	Brown mixture 180 ml	bottle	44	18.00	792.00
41	Budesonide nasal spay	bottle	103	185.00	19,055.00
42	Budesonide inhaler	set	267	190.00	50,730.00
43	Benzyl benzoate emulsion	bottle	35	10.70	374.50
44	Carbamazepine 200 mg	tablet	3,473	0.64	2,222.72

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C5 : Drug and medical supply cost recording form (continued)

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
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No.	Item	Unit	Amount	Price	Total(Baht)
45	Calamine lotion	bottle	843	5.00	4,215.00
46	Calcium carbonate 600 mg	tablet	109,362	0.22	24,059.64
47	Calcium carbonate 1250 mg	tablet	46,154	1.00	46,154.00
48	Calcium gluconate inj.	ampule	9	3.10	27.90
49	Carbidopa+levodopa	tablet	8,290	7.63	63,252.70
50	Carminative	bottle	1,334	10.00	13,340.00
51	Cefazolin 1 g	vial	48	15.70	753.60
52	Ceftazidime 1 g	vial	3	67.50	202.50
53	ceftriazone 1 g	vial	955	25.00	23,875.00
54	Cephalexin dry syrup	bottle	175	20.00	3,500.00
55	Cetirizine 10 mg	tablet	43,276	0.48	20,772.48
56	Chloroquine	tablet	10,946	0.44	4,816.24
57	Chloramphenicol eye drop	bottle	305	9.00	2,745.00
58	Chloramphenicol eye ointment	tube	45	8.79	395.55
59	Chlorhexidine scrub	bottle	1	10.00	10.00
60	Chlorhexidine MW	bottle	326	42.80	13,952.80
61	Cinnarizine tablet	tablet	97,815	0.10	9,781.50
62	Clotrimazole cream	tube	60	6.00	360.00
63	Clotrimazole vaginal tablet	tablet	3,549	7.00	24,843.00
64	Cloxacillin 500 mg inj.	vial	10	7.42	74.20
65	Cloxacillin 1 g inj.	vial	50	14.50	725.00
66	Cloxacillin syrup	bottle	732	18.00	13,176.00
67	Cloxacillin 250 mg	capsule	7,792	1.00	7,792.00
68	Cloxacillin 500 mg	capsule	80	2.40	192.00
69	Colchicine 0.6 mg tablet	tablet	81,093	0.45	36,491.85
70	Condom	piece	3,091	1.80	5,563.80
71	Co-trimaxazole susp.	bottle	656	9.50	6,232.00
72	Co-trimaxazole tablet	tablet	24,697	0.70	17,287.90
73	Chlorpheniramine inj.	ampule	207	2.24	463.68
74	Chlorpheniramine syrup	bottle	2,093	5.00	10,465.00
75	Chlorpheniramine tablet	tablet	47,391	0.06	2,843.46
76	Chlopromazine inj.	ampule	4	3.70	14.80
77	Chlopromazine 50 mg	tablet	7,015	0.33	2,314.95
78	Chlopromazine 100 mg	tablet	22,040	0.52	11,460.80
79	Cyproheptadine tablet	tablet	38,797	0.14	5,431.58
80	Dexamethasone E/E drop	bottle	96	9.50	912.00
81	Dexamethasone inj.	ampule	444	5.14	2,282.16
82	Dextromethophan tablet	tablet	24,361	0.43	10,475.23
83	Diazepam inj.	ampule	222	3.40	754.80
84	Diazepam 2 mg	tablet	40,836	0.11	4,491.96
85	Diazepam 5 mg	tablet	62,076	0.13	8,069.88
86	Diclofenac emulsion	tube	530	12.00	6,360.00
87	Diclofenac inj.	ampule	1,483	2.68	3,974.44
88	Diclofenac tablet	tablet	159,252	0.12	19,110.24

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C5 : Drug and medical supply cost recording form (continued)

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
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No.	Item	Unit	Amount	Price	Total(Baht)
89	Dicloxacillin 250 mg	capsule	95,199	1.30	123,758.70
90	Digoxin inj.	ampule	12	35.10	421.20
91	Digoxin tablet	tablet	20,021	0.18	3,603.78
92	Dihydrazinophthalazine	ampule	7	87.40	611.80
93	Dimenhydrinate inj. 2 ml	ampule	889	9.00	8,001.00
94	Dimenhydrinate inj. 1 ml	ampule	366	4.50	1,647.00
95	Dimenhydrinate tablet	tablet	184,260	0.18	33,166.80
96	Dioctahedral smectite	sachet	376	11.24	4,226.24
97	Diosmin 500 mg	tablet	120	5.10	612.00
98	Diphenhydramine syrup	bottle	1,046	5.50	5,753.00
99	Domperidone susp.	bottle	1,542	5.00	7,710.00
100	Domperidone 10 mg tablet	tablet	48,190	0.24	11,565.60
101	Dopamine inj.	ampule	42	14.98	629.16
102	Doxycycline 100 mg	capsule	2,720	0.46	1,251.20
103	Enalapril 20 mg	tablet	29,571	0.63	18,629.73
104	Enalapril 5 mg	tablet	440,394	0.29	127,714.26
105	Epinephrine inj.	ampule	324	3.21	1,040.04
106	Ergotamine+caffeine	tablet	6,848	0.82	5,615.36
107	Erythromycin syrup	bottle	171	14.00	2,394.00
108	Erythromycin 250 mg	tablet	7,423	1.38	10,243.74
109	Conjugated estrogen cream 5 g	tube	68	80.00	5,440.00
110	Conjugated estrogen cream 14 g	tube	18	230.05	4,140.90
111	Estrogen 0.625 mg	tablet	12,333	3.39	41,808.87
112	Ethambutol 400 mg	tablet	15,636	1.65	25,799.40
113	Ethambutol 500 mg	tablet	1	8,553.00	8,553.00
114	0.5 mg lynestrenol	box	409	25.15	10,286.35
115	FBC plus	tablet	30,920	0.90	27,828.00
116	FBC	tablet	43,947	0.16	7,031.52
117	Ferrous fumarate syrup	bottle	13	46.28	601.64
118	Ferrous sulfate 300 tablet	tablet	480	0.07	33.60
119	Fluconazole 200 mg	tablet	6,633	5.35	35,486.55
120	Flunarizine 5 mg	capsule	74,529	0.50	37,264.50
121	Flufhenazine inj.	vial	124	25.00	3,100.00
122	ยาคุม FMP	box	20	8.00	160.00
123	Folic acid	tablet	49,036	0.12	5,884.32
124	Furosemide 40 mg	tablet	59,659	0.29	17,301.11
125	Furosemide 500 mg	tablet	273	2.40	655.20
126	Furosemide inj.	ampule	75	4.82	361.50
127	Gemfibrozil 600 mg	tablet	284,947	1.54	438,818.38
128	Gentian violet	bottle	15	7.16	107.40
129	Gentamicin inj.	ampule	136	5.35	727.60
130	Glibenclamide	tablet	731,859	0.36	263,469.24
131	Glipizide	tablet	190,241	0.45	85,608.45
132	Glucose 50%	Ampule	2	17.00	493.00

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C5 : Drug and medical supply cost recording form (continued)

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
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No.	Item	Unit	Amount	Price	Total(Baht)
133	Glyceryl trinitrate inj.	ampule	8	140.00	1,120.00
134	Griseofulvin 125 mg	tablet	180	0.40	72.00
135	Griseofulvin 500 mg	tablet	1,081	1.28	1,383.68
136	Guaifenesine syrup	bottle	1,979	9.00	17,811.00
137	Gynecon vaginal tablet	tablet	555	1.38	765.90
138	Haloperidol 0.5 mg	tablet	8,310	0.25	2,077.50
139	Haloperidol 2 mg	tablet	12,380	0.54	6,685.20
140	Haloperidol 5 mg	tablet	43,380	0.86	37,306.80
141	Haloperidol inj.	ampule	57	9.30	530.10
142	Hydrochlorothaizide tablet	tablet	297,364	0.25	74,341.00
143	ฟ้าทะลายโจร	capsule	4,360	0.50	2,180.00
144	Hibiscrub 60 ml	bottle	113	10.00	1,130.00
145	ขมิ้นชัน	capsule	22,880	0.50	11,440.00
146	มะขามแขก	capsule	7,720	0.50	3,860.00
147	มะระขี้นก	capsule	3,740	1.50	5,610.00
148	ยาแก้ไอมะแว้งน้ำเชื่อม	bottle	177	20.00	3,540.00
149	ยาอมมะแว้ง	sachet	323	8.00	2,584.00
150	ครีมไพล	tube	64	17.50	1,120.00
151	พญายอครีม	tube	193	53.50	10,325.50
152	เพชรสังฆาต	capsule	44,267	0.75	33,200.25
153	ชารางจืด	sachet	60	2.50	150.00
154	เถาวัลย์เปรียง	capsule	2,000	0.75	1,500.00
155	ว่านชักมดลูก	capsule	6,940	1.00	6,940.00
156	เจลว่านหางจระเข้	tube	6	34.00	204.00
157	Hydralazine 50 mg	tablet	8,372	0.76	6,362.72
158	Hydrogen peroxide solution	bottle	10	25.78	257.80
159	Hydrocortisone 100 mg	vial	18	51.36	924.48
160	Hydroxyzine 10 mg	tablet	87,602	0.09	7,884.18
161	Hyoscine-N butylbromide inj.	ampule	1,067	4.50	4,801.50
162	Hyoscine-N butylbromide syrup	bottle	264	6.50	1,716.00
163	Hyoscine-N butylbromide tablet	tablet	58,052	0.52	30,187.04
164	Ibuprofen suspension	bottle	82	6.00	492.00
165	Ibuprofen 200 mg	tablet	46,666	0.23	10,733.18
166	Ibuprofen 400 mg	tablet	28,864	0.33	9,525.12
167	Indomethacin 25 mg	capsule	9,222	0.17	1,567.74
168	Isonoazid	tablet	66,377	0.13	8,629.01
169	Isosorbide sublingual 5 mg	tablet	38,301	0.34	13,022.34
170	Isosorbide dinitrate 10 mg	tablet	254,928	0.54	137,661.12
171	Ketoconazole 200 mg	tablet	11,542	2.50	28,855.00
172	Ketotifen 1 mg	tablet	2,825	0.50	1,412.50
173	Lactulose syrup 120 ml	bottle	13	76.00	988.00
174	Lactulose syrup 60 ml	bottle	2	40.00	80.00
175	Lidocaine 2%	vial	25	27.00	675.00
176	Lidocaine viscus	bottle	188	35.00	6,580.00

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C5 : Drug and medical supply cost recording form (continued)

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
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No.	Item	Unit	Amount	Price	Total(Baht)
177	Lincomycin 300 mg/ml(1 ml)	ampule	66	2.50	165.00
178	Lincomycin 300 mg/ml(2 ml)	ampule	401	5.00	2,005.00
179	Liquid paraffin emulsion 240 ml	bottle	175	33.00	5,775.00
180	Liquid paraffin emulsion 30 ml	bottle	278	5.00	1,390.00
181	Lobacin	sachet	1,878	0.45	845.10
182	Lorazepam	tablet	62,103	0.12	7,452.36
183	Lubricanting jelly	tube	14	18.00	252.00
184	Magnesium sulfate 10%	ampule	12	6.80	81.60
185	Magnesium sulfate 50%	ampule	10	6.42	64.20
186	Mebendazole suspension	bottle	18	10.00	180.00
187	Mebendazole 100 mg	tablet	131	0.64	83.84
188	Medroxyprogesterone	vial	115	12.45	1,431.75
189	Mefenamic	capsule	10,541	0.61	6,430.01
190	Meloxicam	tablet	15,652	3.90	61,042.80
191	Metformin 500 mg	tablet	961,910	0.56	538,669.60
192	Methylergometrine	ampule	11	6.00	66.00
193	Methotrexate	tablet	326	8.00	2,608.00
194	Metoclopramide inj.	ampule	590	2.68	1,581.20
195	Metoprolol 100 mg	tablet	155,604	1.33	206,953.32
196	Metronidazole inj.	bottle	1	22.00	22.00
197	Metronidazole 200 mg	tablet	12,560	0.30	3,768.00
198	Methylsalicylate cream	tube	25,710	8.50	218,535.00
199	Methysalicylate ointment	tube	9	8.50	76.50
200	Methyldopa 125 mg tablet	tablet	961	0.68	653.48
201	Methyldopa 250 mg tablet	tablet	5,258	1.60	8,412.80
202	Miconazole cream	tube	2,275	15.08	34,307.00
203	MOM 250 ml	bottle	1,613	15.00	24,195.00
204	Mixtard insuulin(HM)	vial	317	310.30	98,365.10
205	Moduretic	tablet	14,315	0.27	3,865.05
206	Morphine inj.	ampule	13	4.50	58.50
207	Morphine 10 mg tablet	tablet	676	15.00	10,140.00
208	MTV tablet	tablet	117,947	0.21	24,768.87
209	MTV syrup	bottle	169	15.00	2,535.00
210	Naproxen 250 mg	tablet	10,070	1.40	14,098.00
211	Nifedipine 5 mg soft capsule	capsule	2,860	0.60	1,716.00
212	Nifedipine SR 20 mg	tablet	219,251	1.95	427,539.45
213	Norethisterone 5 mg tablet	tablet	1,838	3.00	5,514.00
214	Nofloxacin 200 mg tablet	tablet	35,052	1.00	35,052.00
215	NPH insulin	vial	1,820	310.30	564,746.00
216	Normal saline 1000 ml(irregate)	bag	280	24.00	6,720.00
217	Normal saline 0.9% 100 ml	bag	537	16.00	8,592.00
218	Normal saline 0.9% 1000 ml	bag	706	24.00	16,944.00
219	Normal saline 0.45% 1000 ml	bag	4	24.00	96.00
220	Nystatin oral susp. 12 ml	bottle	27	22.00	594.00

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C5 : Drug and medical supply cost recording form (continued)

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
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No.	Item	Unit	Amount	Price	Total(Baht)
221	Obimin AZ	tablet	2,376	1.68	3,991.68
222	Ofloxacin 200 mg tablet	tablet	36,492	1.80	65,685.60
223	Ofloxacin 100 mg tablet	tablet	30	1.00	30.00
224	Olive oil 450 ml	bottle	2	96.30	192.60
225	Olive oil 60 ml	bottle	45	15.00	675.00
226	Omeprazole 20 mg	capsule	118,656	1.07	126,961.92
227	ORS(children)	sachet	13,730	0.95	13,043.50
228	ORS(Adult)	sachet	11,302	2.00	22,604.00
229	Oxymetazoline 0.025%	bottle	99	32.10	3,177.90
230	Oxytocin 10 IU/ml	ampule	1	11.77	11.77
231	Paracetamol 150 mg/ml	ampule	242	1.54	372.68
232	Paracetamol syrup	bottle	8,018	6.95	55,725.10
233	Paracetamol drop	bottle	249	9.00	2,241.00
234	Paracetamol 325 mg	tablet	146,026	0.09	13,142.34
235	Paracetamol 500 mg	tablet	486,461	0.15	72,969.15
236	PCEC	vial	4,523	294.25	1,330,892.75
237	Penicillin G 5 MU	vial	6	13.68	82.08
238	Penicillin V syrup	bottle	27	9.00	243.00
239	Penicillin V 125 mg	tablet	400	0.41	164.00
240	Penicillin V 250 mg	tablet	10,870	0.76	8,261.20
241	Perphenazine 2 mg tablet	tablet	2,230	0.28	624.40
242	Perphenazine 4 mg tablet	tablet	4,560	0.29	1,322.40
243	Perphenazine 8 mg tablet	tablet	19,660	0.49	9,633.40
244	Pethidine inj.	ampule	16	4.50	72.00
245	Phenobabital inj.	ampule	6	40.00	240.00
246	Phenobabital 30 mg	tablet	6,111	0.10	611.10
247	Phenobabital 60 mg	tablet	46,790	0.13	6,082.70
248	Phenyoin 100 mg	capsule	84,967	0.44	37,385.48
249	Oral pill	pack	150	2.80	420.00
250	Polymyxin+Neomycin	bottle	253	17.12	4,331.36
251	Potassium chloride inj.	ampule	9	4.60	41.40
252	Povidone iodine 30 ml	bottle	745	12.00	8,940.00
253	Prazosin 1 mg	tablet	54,792	0.24	13,150.08
254	Prednisolone cream	tube	93	5.35	497.55
255	Prednisolone 5 mg	tablet	14,963	0.35	5,237.05
256	Proctosedyl suppository	tablet	5,881	4.50	26,464.50
257	Propanolol 10 mg	tablet	107,544	0.39	41,942.16
258	Propanolol 40 mg	tablet	18,607	0.54	10,047.78
259	Propylthiouracil 50 mg	tablet	112,834	0.54	60,930.36
260	Pyrazinamide 500 mg	tablet	18,892	2.10	39,673.20
261	Ranitidine inj.	ampule	361	5.35	1,931.35
262	Ranitidine 150 mg tablet	tablet	467,049	0.41	191,490.09
263	Regular insulin	vial	20	310.30	6,206.00
264	Rifampicin 300 mg	capsule	16,712	3.00	50,136.00

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C5 : Drug and medical supply cost recording form (continued)

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
Fiscal year 2005

No.	Item	Unit	Amount	Price	Total(Baht)
265	Rifampicin 450 mg	capsule	8,434	4.95	41,748.30
266	Ringer's acetate solution 1000 ml	bag	15	34.00	510.00
267	Roxithromycin 150 mg	tablet	14,586	1.28	18,670.08
268	Salbutamol inhaler	bottle	2,037	103.00	209,811.00
269	Salbutamol solution	bottle	4	95.00	380.00
270	Salbutamol syrup 60 ml	bottle	747	8.00	5,976.00
271	Salbutamol 2 mg	tablet	129,349	0.20	25,869.80
272	Serratiopeptidase	tablet	11,853	0.36	4,267.08
273	Silversulfadiazine 1% cream	tube	88	5.00	440.00
274	Simethicone suspension	bottle	144	14.00	2,016.00
275	Simethicone 80 mg tablet	tablet	220,228	0.36	79,282.08
276	Simvastatin 10 mg	tablet	276,043	0.97	267,761.71
277	Sodium bicarbonate 300 mg	tablet	55,355	0.06	3,321.30
278	Sodium fluoride chewable	tablet	9,460	0.05	473.00
279	Sodium bicarbonate 7.5% inj.	ampule	18	22.36	402.48
280	Sodium polystyrene sulfonate	sachet	24	75.00	1,800.00
281	Spironolactone 25 mg tablet	tablet	31,558	1.02	32,189.16
282	Sterile water for injetion 10 ml	ampule	169	2.45	414.05
283	Streptomycin 1 g inj.	vial	154	8.56	1,318.24
284	TAT 1500 IU	dose	62	14.18	879.16
285	Terbutaline 0.5 mg/ml	ampule	99	8.56	847.44
286	Terbutaline 2.5 mg tablet	tablet	4,315	0.12	517.80
287	TT	dose	2,277	23.54	53,600.58
288	Tetracycline 250 mg capsule	capsule	226	0.43	97.18
289	Theophylline 200 mg tablet	tablet	141,047	1.60	225,675.20
290	Thioridazine 50 mg	tablet	7,260	1.30	9,438.00
291	Thyroxin 0.1 mg	tablet	28,488	0.27	7,691.76
292	Ticlopidine 250 mg	tablet	2,176	5.50	11,968.00
293	Tolperisone 50 mg	tablet	328,417	0.42	137,935.14
294	Tramadol inj.	ampule	441	6.88	3,034.08
295	Tramadol capsule	capsule	40,945	0.80	32,756.00
296	Triamcinolone oral base	sachet	1,384	2.85	3,944.40
297	Triamcinolone 0.02%	tube	331	7.45	2,465.95
298	Triamcinolone 0.1%	tube	2,637	9.50	25,051.50
299	Triamcinolone inj.	vial	114	13.50	1,539.00
300	Trihexylphenidyl 2 mg	tablet	100,476	0.21	21,099.96
301	Unison enema 50 ml	box	311	9.00	2,799.00
302	Unison enema 10 ml	box	130	7.00	910.00
303	Vassaline	tube	32	5.00	160.00
304	Verapramil inj.	ampule	1	15.00	15.00
305	Verapramil 40 mg	tablet	12,018	0.80	9,614.40
306	Vitamin B1-6-12	tablet	442,911	0.38	168,306.18
307	Vitamin B1 inj.	ampule	7	1.28	8.96
308	Vitamin B1	tablet	810	0.05	40.50

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C5 : Drug and medical supply cost recording form (continued)

Dispensing service in outpatient unit, Pharmacy department in Ladyao Hospital, Nakhonsawan Province
Fiscal year 2005

No.	Item	Unit	Amount	Price	Total(Baht)
309	Vitamin B2	tablet	1,887	0.10	188.70
310	Vitamin B6	tablet	320	0.07	22.40
311	Vitamin Bco 10 ml	vial	6	10.02	60.12
312	Vitamin Bco 1 ml	ampule	112	2.70	302.40
313	Vitamin Bco	tablet	287,570	0.12	34,508.40
314	Vitamin C 100 mg	tablet	55,075	0.10	5,507.50
315	Vitamin K1(1 mg/0.5ml)	ampule	1	10.48	10.48
316	Vitamin K1(10 mg/ml)	ampule	4	13.04	52.16
Total(Baht)					10,119,683.33

Cost of the chemical substance in compounded drug

No.	Formula	Amount	Unit	unit cost	Total (Baht)
1	KCL elixir	219	60 ml	12.00	2,628.00
2	NaF MW	1,270	120 ml	10.00	12,700.00
3	SMW	741	120 ml	10.00	7,410.00
4	Ladyao Balm	544	10 g	20.00	10,880.00
Total(Baht)					33,618.00

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C6 :Office and household cost recording form

Pharmacy dispensing service in outpatient unit in Ladyao Hospital, Nakhonsawan Province in the FY 2005

Activities	Sub-activities	Items	Amount	Unit	Price/unit	Direct cost(Baht)	Indirect cost(Baht)	Total(Baht)
Pre-pack the pill and prepare the foiled drug	1.1.1 Prepare the label of pre-pack drug	Book no.2	1	Pieces	35.00	35.00	341.76	376.76
	1.1.2 Pre-pack the pill	Plastic container	2	kg	100.00	200.00		
		Plastic container with protection from light	1	kg	125.00	125.00		
		Pre-pack sticker	2,500	Pieces	0.05	125.00	903.88	1,353.88
	1.1.3 Prepare the foiled drug	Rubber	4	Packs	20.00	80.00	346.26	426.26
	1.1.4 Record the pre-package	Book no.2	1	Pieces	35.00	35.00	85.44	120.44
Preparation of equipments and place	1.2.1 Prepare and/or arrange the equipment in pharmacy dispensing room	-	-	-	-	-	76.45	76.45
	1.2.2 Clean room and others	Broom	1	Pieces	15.00	15.00		
		Feather duster	2	Pieces	50.00	100.00		
		Mop	1	Pieces	35.00	35.00		
		Busket	1	Pieces	25.00	25.00		
		Sprayer	1	Bottle	30.00	30.00		
		Glass cleaning	1	Bottle	160.00	160.00		

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C6 :Office and household cost recording form (continued)

Pharmacy dispensing service in outpatient unit in Ladyao Hospital, Nakhonsawan Province in the FY 2005

Activities	Sub-activities	Items	Amount	Unit	Price/unit	Direct cost(Baht)	Indirect cost(Baht)	Total(Baht)
Preparation of equipments and place (continued)	1.2.2 Clean room and others (continued)	Detergent	1	Box	75.00	75.00		
		Detergent	1	Box	725.00	725.00		
		Cleaning liquid	13	Gallon	100.00	1,300.00		
		Small bag	24	kg	49.00	1,176.00	166.39	6,502.39
Service time table arrangement	1.3 Arrange service time table	Large bag	55	kg	49.00	2,695.00	4.50	69.50
Prepare the compounded drug	1.4.1 Calculate and prepare the compounded drug	Book no.2	4	Pieces	35.00	140.00		
		Plastic bottle 30 ml	1,333	Bottles	0.72	959.76		
		Plastic bottle 60 ml	219	Bottles	1.00	219.00		
		Plastic bottle 120 ml	2,011	Bottles	1.50	3,016.50		
		Small box 30 g	500	Boxes	0.70	350.00	103.43	4,788.69
	1.4.2 Move and arrange the compounded drug on the pharmacy dispensing shelves	-	-	-	-	-	35.98	35.98

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C6 :Office and household cost recording form (continued)

Pharmacy dispensing service in outpatient unit in Ladyao Hospital, Nakhonsawan Province in the FY 2005

Activities	Sub-activities	Items	Amount	Unit	Price/unit	Direct cost(Baht)	Indirect cost(Baht)	Total(Baht)
Checking and withdrawing drug from main stock	2.1.1 Check the remain stock and calculate the withdrawn amount in sub-stock	Book no.2	2	Pieces	35.00	70.00	4.50	74.50
	2.1.2 Withdraw drug from the main stock	Folder	2	Pieces	52.00	104.00	148.40	252.40
Drug arrangement	2.2.1 Move the drug from main stock to sub-stock	-	-	-	-	-	314.78	314.78
	2.2.2 Arrange the drug on the sub-stock and pharmacy dispensing shelves	-	-	-	-	-	35.98	35.98
Receive prescription and print the label of drug	3.1.1 Screen prescription and form the patient's queue	Running number	1	Pieces	500.00	500.00	1,164.70	1,664.70
	3.1.2 Input the information of prescription on the computer	-	-	-	-	-	3,021.92	3,021.92
	3.1.3 Conclude the expenditure and print the prescription and labels of drug	Prescription	137,046	Prescriptions	0.60	82,227.60	2,284.43	88,512.03
		Ink EPSON LQ300	40	Pieces	100.00	4,000.00		
	3.1.4 Stick the labels and put them into the drug basket	Basket	50	Pieces	17.00	850.00		

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C6 :Office and household cost recording form (continued)

Pharmacy dispensing service in outpatient unit in Ladyao Hospital, Nakhonsawan Province in the FY 2005

Activities	Sub-activities	Items	Amount	Unit	Price/unit	Direct cost(Baht)	Indirect cost(Baht)	Total(Baht)
Receive prescription and print the label of drug (continued)	3.1.4 Stick the labels and put them into the drug basket (continued)	Label of drug	615,835	Labels	0.20	123,167.00		
		Plastic container	20	Kg	100.00	2,000.00		
		Plastic container with protection from light	10	Kg	125.00	1,250.00	1,470.49	128,737.49
Drug arrangement	3.2.1 Arrange drug	Scissor	3	Pieces	15.00	45.00		
		Spoon	5	Pieces	7.00	35.00	6,102.29	6,182.29
	3.2.2 Drug arranger sings in and form queue	-	-	-	-	-	2,104.55	2,104.55
Checking drug	3.3.1 Check drug	-	-	-	-	-	3,044.40	3,044.40
	3.3.2 Form the queue again	-	-	-	-	-	980.32	980.32
Dispensing	3.4.1 Double check drug	-	-	-	-	-	2,284.43	2,284.43
	3.4.2 Dispense and advice	Ink case	2	Pieces	27.00	54.00		
		Plastic bag	10	Kg	45.00	450.00	5,436.75	5,940.75
	3.4.3 Classify the prescription according to the patient's right	Basket	10	Pieces	17.00	170.00	629.57	799.57

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C6 :Office and household cost recording form (continued)

Pharmacy dispensing service in outpatient unit in Ladyao Hospital, Nakhonsawan Province in the FY 2005

Activities	Sub-activities	Items	Amount	Unit	Price/unit	Direct cost(Baht)	Indirect cost(Baht)	Total(Baht)
Billing	3.5.1 send the prescription to the financial personnel	Basket	2	Pieces	17.00	34.00	1,771.78	1,805.78
	3.5.2 Call the patient's name and bill	Accounting book	585	Pieces	20.00	11,700.00	11,399.64	23,099.64
Problem investigation and counseling	4.1.1 Meet and take the patient to the counseling room	-	-	-	-	-	8.99	8.99
	4.1.2 Examine the medication history of patient	-	-	-	-	-	8.99	8.99
	4.1.3 Counseling	Boucher	350	Pieces	1.70	595.00	8.99	603.99
	4.1.4 Conclude and record counseling	Folder	1	Pieces	52.00	52.00		
		Book no.2	1	Pieces	25.00	25.00	4.50	81.50
Become aware of and resolve AER	5.1.1 Meet uncertainty AER case	-	-	-	-	-	8.99	8.99
	5.1.2 Examine the history of patient and assess symptom	-	-	-	-	-	13.49	13.49

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C6 :Office and household cost recording form (continued)

Pharmacy dispensing service in outpatient unit in Ladyao Hospital, Nakhonsawan Province in the FY 2005

Activities	Sub-activities	Items	Amount	Unit	Price/unit	Direct cost(Baht)	Indirect cost(Baht)	Total(Baht)
Become aware of and resolve AER (continued)	5.1.3 Conclude, record and/or give AER card	Folder	1	Pieces	52.00	52.00		
		Book no.2	1	Pieces	25.00	25.00	8.99	85.99
Aware and resolve medication error	6.1.1 Check and classify medication error	Mac	10	Boxes	6.00	60.00	40.47	100.47
	6.1.2 Resolve medication error	-	-	-	-	-	85.44	85.44
	6.1.3 Record medication error	-	-	-	-	-	22.48	22.48
Prescription reporting	7.1 Count the prescription and calculate the expenditure of treatment	-	-	-	-	-	8.99	8.99
Counseling reporting	7.2 Report counseling conclusion	-	-	-	-	-	13.49	13.49
AER reporting	7.3 Report AER conclusion	-	-	-	-	-	449.69	449.69
Medication error reporting	7.4 Report medication error conclusion	Folder	1	Pieces	52.00	52.00	22.48	74.48
Total(Baht)						239,203.86	44,969.00	284,172.86

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C7: Public utility recording form

Dispensing service in outpatient unit, Pharmacy department of Ladyao Hospital, Nakhonsawan Province in the FY 2005

Electricity

Room	Items	Electric power (watt)	Quantity	Working time used (hr/day)	Electric unit (unit/month)
Dispensing room	Electric light	36	13	16	224.64
	Electric light	18	2	16	17.28
	Television	56	1	16	26.88
	Fan	52	3	16	74.88
	Fan	30	1	16	14.40
	Refrigerator	60	1	24	43.20
	Refrigerator	140	1	24	100.80
	Refrigerator	429	1	24	308.88
	Air Filter	53	1	16	25.44
	Computer	264	1	16	126.72
	Computer	286	1	16	137.28
	Computer	308	1	16	147.84
	Printer	66	2	16	63.36
	Microwave	600	1	1	18.00
	Boiler	670	1	8	160.80
	Rice cooker	700	1	0.5	10.50
	Loud-speaker	330	1	16	158.40
	Loud-speaker	440	1	16	211.20
	Air Condition	176	1	16	84.48
Counseling room	Fan	52	1	4	6.24
	Electric Light	14	3	4	5.04

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C7: Public utility recording form (continued)

Dispensing service in outpatient unit, Pharmacy department of Ladyao Hospital, Nakhonsawan Province in the FY 2005

Room	Items	Electric power (watt)	Quantity	Working time used (hr/day)	Electric unit (unit/month)
Pharmacist's office	Electric Light	36	8	8	69.12
	Electric Light	32	1	8	7.68
	Electric Light	18	2	8	8.64
	Air Condition	132	1	8	31.68
	Fan	52	1	3	4.68
Pharmacist's office(cont.)	Refrigerator	175	1	24	126.00
	Sterio	32	1	5	4.80
	Printer	40	1	8	9.60
	Computer	396	2	8	190.08
	Fan	18	1	8	4.32
Sub-stock	Fan	18	1	24	12.96
	Electric light	32	3	8	23.04
	Electric light	18	1	8	4.32
	Air Condition	176	1	24	126.72
Total (Baht)					2,589.90

Electricity cost: 1.Electricity based	1.1 Electricity power		5,542.39	Baht/month
	1.2 Service price		228.17	Baht/month
	Total electricity based		5,770.56	Baht/month
2. Ft value	0.4328 Baht/unit		1,120.91	Baht
3. VAT(7%)			482.40	Baht
	Total electricity cost		7,373.87	Baht/month
			88,486.41	Baht/year

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C7: Public utility recording form (continued)

Dispensing service in outpatient unit, Pharmacy department of Ladyao Hospital, Nakhonsawan Province in the FY 2005

Water supply

Month	Total (Baht)	Month	Total (Baht)
October 2004	546.24	April 2005	666.08
November 2004	620.00	May 2005	652.00
December 2004	610.44	June 2005	648.00
January 2005	546.24	July 2005	3,698.00
February 2005	533.00	August 2005	4,494.75
March 2005	571.38	September 2005	5,954.55

Total water supply in Ladyao Hospital during FY 2005 =		19,540.68	Baht
Fiscal year 2005:	Personnel of Ladyao hospital	240	Persons
	Personnel of Pharmacy department	24	Persons
	Proportion	10.00	%
Water supply cost in outpatient pharmacy dispensing		1,954.07	Baht/year
	Total public utility cost	90,440.48	Baht/ year

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C8: Maintenance and repairing recording form

Dispensing service in outpatient unit, Pharmacy department
Ladyao Hospital, Nakhonsawan Province
Fiscal year 2005

Month / year		Maintenance/ repairing
October	2004	0.00
November	2004	250.00
December	2004	0.00
January	2005	0.00
February	2005	350.00
March	2005	0.00
April	2005	0.00
May	2005	0.00
June	2005	0.00
July	2005	1,600.00
August	2005	0.00
September	2005	0.00
Total (Baht)		2,200.00

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BIOGRAPHY

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