

Unit cost analysis of Thai massage: Case study from Huayploo Hospital, Thailand

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Abstract

This paper is a report of a study conducted to evaluate the unit cost of Thai massage at Thai Traditional Medicine Centre in Huayploo Hospital, Thailand. A retrospective cost analysis was performed on body massage services in 2013 fiscal year. The data on the costs of the direct costs were retrieved from the center records of Thai Traditional Medicine Centre, Huayploo Hospital. The indirect cost which had no record were estimated by the Head of Thai Traditional Medicine Centre. The unit costs of massage were calculated based on the activity-based costing. The unit cost analysis begins with the construction of a detailed flow diagram incorporating each activity in the process of massage. The cost of each activity is then calculated, and the two are linked. One-way sensitivity analyses were undertaken where each parameter was varied through a range of plausible values (rate of service utilization per day and direct massagers' wage) and changes to the base results were observed. Total cost of massage service in 2103 was 4,546,155.02 Thai baht. The major driver of costs was personnel cost, which accounted for 79.49% of the total. Unit cost of massage service was 254.19 Thai baht per visit. As can be seen, direct cost, which comprises personnel costs for massage service is the largest proportion that impact directly to unit cost. Further sensitivity analysis using personnel cost and volume of visit factors revealed that the unit cost varied from 262.27 to 270.35 baht and from 241.76 to 193.06 baht, respectively. The results are a starting point for further investigations aimed at the exploitation of resources absorbed by Thai Traditional Medicine Centre opposed to the need to provide clients with the best possible services. In conclusion, massage cost analysis provides detailed information about the costs which may be used to manage the suitable costs with quality of service.

Keyword: Unit cost, Thai massage, activity-based costing

1. INTRODUCTION

Massage is the manipulation of superficial and deeper layers of muscle and connective tissue using various techniques, to enhance function, aid in the healing process, decrease muscle reflex activity, inhibit motor-neuron excitability, promote relaxation and well-being, and as a recreational activity. In Thailand, there is cultural acknowledgement of a range of traditional therapies (including complementary therapies) widely used in Thai health care. Thai traditional massage is one of the most valuable heritages handed down from Thai

ancestors. Thai massage has been well known among Thai population especially in rural areas for a long time. It is an old-traditional manual form of treatment which is used equally for physical and mental relaxation as well as specific therapeutic treatment of different pains and illness. Some studies have shown Thai traditional massage to be beneficial for the treatment of a wide variety of ailments such as an increase in bone formation and re-sorption markers¹⁻², increasing the number of lymphocytes of cancer patients who are undergoing chemotherapy³, relieving low back pain⁴⁻⁶,

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stroke rehabilitation treatment⁷ and increasing relaxation and decrease anxiety and pain intensity in patients with SCS.⁸⁻⁹ In addition, using traditional Thai massage, herbal treatments and physical therapies has produced significant improvements in activities of daily living, mood, pain and sleep patterns of stroke patients¹⁰. Low back pain is one of the most common and costly musculoskeletal problems in modern society. From the evidences show that massage is effective for persistent back pain and may reduce the costs of care after an initial course of therapy¹¹. Average utilization of Thai massage for treat illness was 4.7 times per year and 81.7% of this group paid out of their pocket¹². The Ministry of Public Health has promoted the utilization of Thai massage¹³. Most of community hospitals have provided Thai traditional medication, especially Thai massage. Huayploo Hospital (a public community hospital) established Thai Traditional Medicine Centre for providing Thai medication in 2006. Body massage is the popular form of alternative care for relaxation, stretching muscle. The service charge fixed by The Ministry of Public Health (200 per service) has been constant since 2006, however, the actual cost of body massage service of Huayploo Hospital remains unknown. The objective of the present study was to evaluate the unit cost of massage service at Huayploo Hospital. Because the availability of the actual cost of service is the need to plan budget for service which effects to the quality of providing service.

Unit cost or cost per unit of service is simply part of good program budgeting and accounting practices, which allow managers to determine the true cost of providing a given unit of service. Various methods have been proposed and used in the unit cost analysis. The conventional cost-accounting systems were developed in the early days of mass production. The primary objective of this system was to assign costs to inventory and products

sold. In determining the cost of a product, overhead (indirect cost), which is small in comparison, was allocated in proportion to direct costs (eg, labor, materials), frequently by using volume of production as a proxy (volume-based cost accounting). Although these cost-accounting systems were adequate for pricing and inventory control, their shortcomings became increasingly obvious as manufacturing processes became more complicated. The lack of detailed information and the inappropriate allocation of indirect costs were leading to costly mistakes, such as under- or overpricing of the product, inappropriate and ineffectual cost-containment measures, and even. The second method is activity-based costing (ABC)¹⁴ which was developed to address the limitations of conventional (volume-based) cost accounting systems. Activity based costing (ABC) as a method of measuring the cost, assigns costs to activities based on their consumption of resources and then allocates costs to cost objects based on their required activities. In practice, most applications of ABC make arbitrary allocations of common costs. The search for the activities which connect costs to products and processes, and for the cost drivers which proxy for them, involves compromise between accuracy and manageability. The result is that some indirect costs are excluded from the cost-pools associated with a practical set of cost drivers¹⁵. In an activity-based costing system, the cost of a product (or, in medicine, a health care service) is the sum of the costs of all activities and resources required to manufacture, deliver, and service that product. The advantages of activity-based costing systems are that they link costs to work and that proper allocation of indirect expenses gives a more accurate picture of the true costs of a process. The service industries (such as medical care) have discontinuation of the manufacture of the most profitable product line so ABC technique is suitable to analysis cost of this industry.

MATERIALS AND METHODS

2.1. Process of massage

Thai massage cost analysis is a method for linking costs to massage processes. Flow diagram of the steps involved in the process of massage was developed by observing service process in Thai Traditional Medicine Centre, Huayploo Hospital in October 2013.

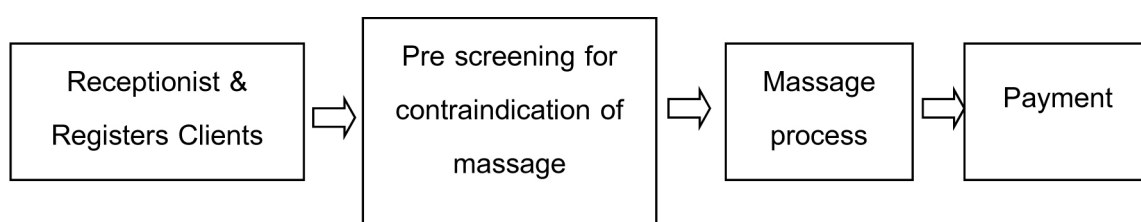


Figure 1. Flow diagram illustrating the steps in the process of massage services.

2.2. Resources consumed

Cost of massage was evaluated from the perspective of the healthcare provider (hospital). Resource use and costs in relation to massage services in the 2013 fiscal year (from October 1st, 2012 to September 30th, 2013) were estimated for key elements of massage by using a variety of data collection methods. Estimates of routine resource use for massage and staffs' compensation were collected from the records of centre. Clients' attendances were estimated from service records of clients during 12 months of 2013. However, building space used, technician maintenance of equipment were estimated by general accounting principle. Information about the resources consumed which had no record was obtained from interviews with the head of the Thai Traditional Medicine Centre, Huayploo Hospital. Cost data were performed all the calculations considering the 2013 prices in Thai baht.

2.3. Unit costs of the resources

The cost of each of the resources consumed was then calculated. Personnel cost, were calculated from the total compensation, including fringe benefits and paid vacation

(Figure 1). Then, the activities performed during each step and the resources consumed in the course of each activity are identified, and the unit cost of each resource is calculated. Traditional Thai massage is really a deep, full-body treatment, starting at the feet and progressing up to the head and then it take about 1 hour for full course.

for each individual, prorated for the time spent in each activity. The costs of supplies and ancillary services were obtained from the appropriate department (maintenance department and housekeeping). The cost of hospital and office space and the cost of equipment were calculated using standard assumptions and by prorating the costs of plant operations, maintenance, and depreciation and amortization in each case. Finally, the attributable departmental overhead expense was factored in to complete the analysis of process-based cost for each step. A unit cost is simply the "average total cost" of producing one unit of output. A unit cost is calculated by dividing the total cost of production by the total number of units of output produced. Then, the cost per unit calculation is:

$$\frac{\text{(Total direct costs + Total indirect costs)}}{\text{Total units of services}}$$

2.4. Sensitivity analysis

We performed one-way sensitivity (rate of service utilization per day and direct massagers' wage) to test robustness and identify the most important variables influencing massage cost.

3. RESULTS

The Thai Traditional Medicine Centre, Huayploo Hospital provides Thai massage every day (08.30 am - 8.30 pm on Monday to Friday, 08.30 am - 4.30 pm on Saturday and Sunday). There are 31 staffs

(21 massagers and 10 supportive staffs). The annual number of clients' visit was estimated from information in the daily client records. Table 1 show that the average frequency utilization of massage service in 2013 was 49 visits per day. (41.9% of total service utilization per day)

Table 1. Average utilization of each services type in 2013

Type of services	Average visit per day
Body massage	49
Herbal sauna	2
Herbal compress	41
Hot salt compress	2
Traditional medicine	18
Total	117

3.1. Total annual direct costs of massage service

Direct costs are those costs that can be traced exclusively to one output, such as hands on labor or material consumed directly in the production of an output. The estimated direct and overhead costs for each step in the process of massage for the typical client undergoing an operation for massage are

depicted in Figure 1. Direct cost of massage service consists of labor (personnel) cost, materials cost and capital depreciation of building cost. Table 2 displays the costs component of direct cost derived using actual data for massage service. The annual inpatient direct cost of massage service totaled 3,505,892.57 Thai baht in 2013. The large component was personnel cost (86%). (Table 2)

Table 2. Total annual direct cost of massage service in 2013

Component of direct cost	Thai baht	%
Labor (personnel) cost	3,011,040.00	85.9
Materials cost	183,844.57	5.2
Capital depreciation of building cost	311,008.00	8.9
Total direct cost	3,505,892.57	100.0

3.2. Total annual indirect cost of massage service

Indirect costs are those costs which benefit two or more outputs but not all outputs. Typically these costs are allocated among the various outputs which they benefit. Overhead costs associated with non-massage service (i.e. financial staffs, administration)

are distributed to massage unit and then to intermediate products using a step-down method, based on amount of massage services utilization.

The square feet of space of massage service providing are not used to be base for allocation of depreciation cost of building because most of service are provide in the

same area. The total cost for a specific patient encounter is calculated by aggregating costs associated with intermediate products.

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Table 3. Total annual indirect cost of massage service in 2013

Component of indirect cost	Total cost of The Thai Traditional Medicine Centre	Allocated cost for massage service	
		(Thai baht)	%
Labor cost	1,325,422.00	602,761.42	57.9
Overhead cost	445,695.19	186,746.28	18.0
Capital depreciation of building cost	598,460.00	250,754.74	24.1
Total indirect cost	2,369,577.19	1,040,262.44	100.0

Note: allocation factor is amount of services for massage service (41.9%)

The annual indirect labor cost was a summation of allocated ancillary staffs' compensation (applied Thai Traditional Medicine staffs, office staffs, administrative staffs, laundry & linens staffs). In 2013, the

annual indirect labor cost was 602,761.42 Thai baht and. Table 4 show that more than half of indirect cost was the office staffs' compensation.

Table 4. Annual indirect labor cost in 2013.

Component of indirect labor cost	Annual indirect labor cost of centre (Thai baht)	Annual indirect labor cost of massage	
		(Thai baht)	(%)
Applied Thai Traditional Medicine staffs	236,082.00	98,918.36	16.4
Office staffs	879,340.00	368,443.46	61.1
Administrative staffs	128,400.00	53,799.60	8.9
Laundry & linens staffs for massage only	81,600.00	81,600.00	13.5
Total	1,325,422.00	602,761.42	100.0

Note: allocation factor is amount of services for massage service (41.9%)

Total indirect cost of massage is 1,040,262.44 Thai baht per year which compresses of indirect labor cost (58%), indirect cost of capital depreciation of building cost (24%) and indirect material cost (18%). (Table 3)

Total cost of massage service in

2013 was 4,546,155.02 Thai baht. Direct-indirect cost ratio is 77.12: 22.88. (Table 5) The highest costs were due to the personnel cost (79.49% of the total). The remainder of the total cost accounted for capital depreciation of building cost (12.36% of the total), and the cost of material cost (8.15% of the total)

Table 5. Total cost of massage service in 2013

Cost	Thai baht	%
Direct cost	3,505,892.57	77.12
Indirect cost	1,040,262.44	22.88
Total cost	4,546,155.02	100.00

Unit cost of massage was the average of total cost by total number of service utilization (17,885 clients) equal 254.19 Thai baht.

3.3. Sensitivity analysis

The data showed that personnel cost and the volume of these massage service were the major factors which effect massage service cost. Then one way sensitivity analyses was performed that focused on variations of personnel cost and the volume of these massage service. Because the Thai government officials' salary increase about 6% every year so sensitivity analysis for this

factor is vary from 4% to 8%. The massage service cost was varied from 262.27 to 270.35 Thai baht per visit (Table 6). The utilization of massage service data showed that The Thai Traditional Medicine Centre provides about 45% of total capacity so the increased volume of provision per day should reduce unit cost of massage service. The Thai Traditional Medicine Centre can provide up to 90 massage services per day. The 60-100% utilization rate effect the unit cost of massage from 241.76-193.06 Thai baht per visit. (Table 7)

Table 6. Sensitivity analysis with personnel cost

Increasing rate	Annual increasing personnel cost (Thai baht)	Annual total massage service cost (Thai baht)	Total massage cost/visit
4%	144,552.06	4,690,707.08	262.27
6%	216,828.09	4,762,983.11	266.31
8%	289,104.11	4,835,258.6	270.35

Table 7. Sensitivity analysis with volume of services

% increased volume of services	Number of visits per day	Annual increased personnel cost (Thai baht)	Total annual cost of massage (Thai baht)	Unit cost of massage per visit
60%	54	219,000	4,765,155.02	241.76
80%	72	1,007,400	5,553,555.02	211.32
100%	90	1,795,800	6,341,955.02	193.06

4. DISCUSSION

Cost analyses is may improve understanding of activity operation, and tells what activity is most cost-effective. This information might influence decisions about how to serve effectively. Hospital managers can use cost information in designing service, budgeting and allocating funds to get the most out of their resources. In this study, we used process cost analysis to apply the principles of activity-based costing to massage service. Because ABC attributes support costs based on the actual consumption of the goods and services provided. ABC is typically used to calculate costs for specific services, appropriate for fee-for-service reimbursement, but can also be used to calculate the cost of a bundled package of services¹⁵. Massage has been defined as a systematic and scientific manipulation of the soft tissues of the body with rhythmical pressure and stroking for the purpose of obtaining or maintaining health. This means that massage service is labor intensive job. Not surprisingly, the largest element of massage service cost contributed to the direct personnel costs (3,011,040 Thai baht) and the major driver of massage service costs was personnel cost, which approximated 80% of the total. The massage service cost per visit was 254.19 Thai baht, which is higher than setting price (200 Thai baht). Three main factors affecting price-setting methods are: 1) The method of provider payment, 2) The availability of information, including providers' costs, volumes, outcomes, and methods used to calculate costs, 3) Characteristics of purchasers and providers, including the regulatory environment, provider autonomy, negotiating power, and the degree of competition¹⁶. Costing studies are optimal for setting prices proportionate to costs; but where accurate unit costs are not available other options exist for approximating the appropriate prices, for example, by importing reimbursement systems in use in other alternative treatment such as the reimbursement for physical therapy¹⁶.

Capital depreciation of building cost is another important cost component in massage service (12%). The impact of personnel cost is of primary concern in massage services, and it is also an important part of the total quality service. Cost management in personnel activities should been given a great deal to reduce the total cost of massage service. The data showed that the average utilization of massage service per day did not meet the full capacity service of 21 massagers. As expected, the unit cost of massage service decrease with increasing volume of visits. Marketing strategy may be considered for reducing the financial loss of massage service. In another hand, cost structure management should be revised for such as propose.

Sometimes costs and monetary values are considered less important than other, more intangible values or program outcomes. In some alternative therapies, including traditional Thai Medicine has antique origins in East or South Asia and are entirely alternative medical systems; Traditional medicine has a long history. It is the sum total of the knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as in the prevention, diagnosis, improvement or treatment of physical and mental illnesses. The terms complementary/alternative/non-conventional medicine are used interchangeably with traditional medicine in some countries. Thai massage is one of the oldest massage techniques in existence today. Since The Thai government has supported traditional Thai medicine as national policy, Thai massage has gain credibility in the usual massage in Thailand¹⁷. Traditional Thai Massage (TTM) is very popular, not only in Thailand but also in other countries in the world. Massage also promotes a feeling of well-being and a sense of receiving good care.¹⁸ The previous studies demonstrate positive effects of TTM for specific circumstances.^{7-8,19-23}

In 1990, Thailand introduced a Social Security Scheme (SSS), a compulsory social insurance scheme that covers formal sector private employees. The Social Security Office (SSO) collects funds and purchases health services from both public and private hospitals at a capitation rate to cover all services to which SSS beneficiaries are entitled under the scheme. The capitation payment is a fixed payment per worker per year regardless of service utilization.²⁴⁻²⁵

This reform faced the challenge of converting a centrally planned hospital sector, where payments had been made through global budgets based on negotiations and hospital size to a per-case payment system. If prices do not reflect actual costs and public health objectives are not taken into consideration in pricing health services, a range of undesired consequences may result. Providers may charge informal payments to compensate for inadequate formal payments, or they may avoid treating sicker patients. Services provided may be of suboptimal quality. Inappropriate referral patterns may develop between different levels or sites of service. Services may be either under- or over-utilized, depending on the relationships between the price, the actual cost of services, the value of services to individuals, and the presence of positive externalities for services, such as immunization, that provide health benefits beyond the individual to whom they are directly provided. Thailand, the Social Security Administration to pay capitated payments to contracted public and private hospitals on behalf of insured workers. Capitated payments to contracted hospitals cover all inpatient and outpatient services not necessitated by a work-related illness²⁶⁻²⁷. Huayploo Hospital as a main contractors (MCs) receive definite budget from SSS for all of hospital service. However, financial management is a key success for sustainable organization.

Limitations of the study

This is one of few prospective studies estimating costs of Thai massage

service in Huayploo Hospital and, to our knowledge, the first to describe volume of massage utilization according to their socio-demographic variation. Besides budget information, being able to determine unit costs means that collecting the right kind of information about clients and outcomes are need. Clearly, fiscal accountability is one of the primary reasons for using any kind of cost analysis. Further research is required to clarify service statistics and financial records that are accurate and up-to-date enough to be able to determine some very basic information about unit costs. Careful consideration should be given to the kinds of client and cost data that will be needed, so that it can be built into the accounting and record-keeping systems of the center. This study was identified from a community hospital database. Therefore, a limitation of the study concerns the generalisability of present cost findings to other setting. Additional research is needed to demonstrate the accuracy, acceptability and feasibility of massage service in various setting, particularly of comparative treatment with conventional care.

5. CONCLUSION

Economic evaluations can provide health-care decision makers with valuable information on the relative efficiency of alternative health-care services, health-care services at different health-care providers. Results from the present study can be used to improve the budgeting of the hospital.

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