ACHSM Asia-Pacific Journal of Health Management

RESEARCH ARTICLE

COST ANALYSIS OF OUTPATIENT CARE FOR MENTAL AND BEHAVIORAL DISORDERS DUE TO PSYCHOACTIVE SUBSTANCE USE: A STUDY OF FOUR COMMUNITY AND TWO GENERAL HOSPITALS IN THAILAND

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ABSTRACT

This cost analysis study gathered cost information from four community and two general hospitals in the fiscal year 2014, including service data, hospital statistics, and financial information. This study aimed to estimate the treatment costs of outpatient care for mental and behavioral disorders (MBDs) due to psychoactive substance use, which are provided in the community and general hospitals in Thailand. We used ICD-10 codes F11-F19, to handle the diagnosis codes of MBDs due to psychoactive substances and cost analysis. The unit cost per OPD visit was analyzed according to the cost analysis guidelines of the Ministry of Public Health, Thailand, using two procedures: a traditional method and a cost-to-charge ratio. The inflation rate from 2015 to 2021 was employed to adjust the cost to demonstrate the actual cost in 2021.

The majority of service expenses were labour costs (53%), followed by material costs (42%) and capital costs (6%). The unit cost per OPD visit for substance use disorders (SUD) in 2014 ranged between 172 and 762 THB. After being adjusted by the inflation rate to estimate the cost for 2021. The costs were growth in the range of 204 to 905 THB. The median cost estimated in 2021 from four community and two general hospitals, accounting for between 396 and 769 THB respectively.

The unit SUD visit costs of OPD from these six hospitals were quite close to the unit costs of the drug treatment centers. The greatest proportion of the total service expenses was the labor cost. Accordingly, human resources are believed to be a crucial challenge that needs to be considered and planned to deliver successful services.

Notably, these hospitals were selected using purposive sampling and might not be representative of each hospital type. More hospitals should, therefore, be recruited in further research to represent the actual cost by hospital type.

KEYWORDS

unit cost, outpatient cost, psychoactive substances use, drug abuse, cost per visit.

INTRODUCTION

Substance dependence is a major problem that is affecting all countriesandneeds immediate and appropriate means to address this problem, especially the problem in youth groups which is reported in an increasing number of new incidences worldwide. In Asian countries, substances such as marijuana (synthetic cannabinoids (SCs)), Kratom, and volatile nitrites (known as poppers), have been found to be the most common [1]. Marijuana is often used in combination with other addictive substances, such as opioids, synthetic substances (heroin), or alcohol, which was pointed out in a survey of adolescents in the United States [2]. Furthermore, opioid overdoses have been reported to be the cause of an increase in the number of deaths in the United States [3].

A National Household Survey on Substance Abuse in Thailand in 2016 estimated that more than 2.9 million people had used at least one substance during their lifetimes, or 5.8% of the population aged 12 to 65. The most commonly used substances were Kratom or Mitragyna speciosa, methamphetamine, methamphetamine hydrochloride crystal (ice), and marijuana (cannabis) [4]. Thailand is one of many countries that faces substance use problems on a larger scale. The number of people with substance use being treated under the judicial process is likely to increase continuously, with 44,342 cases in 2013 and 203,381 in 2018, which showed a nearly five-fold increase in just five years [5].

There is information available from a survey of the 15-64 age group with 30,411 participants in 2016, which indicated that 49.7% were new psychoactive substance users [6]. Although many people who use substances have received therapy, some clients in recovery from substance use have a high incidence of relapse. Many variables contribute to the recurrence of substance misuse, such as being able to purchase substances at a cheap price, beginning to abuse substances at a young age, and self-deprecation without therapy [7]. Substance abuse has a significant impact on the number of crimes committed. In 2013, more than 80% of crimes were attributed to illicit substance use [4].

One significant impact of substance abuse is its effects on brain functions, neurotransmitter functions, and neurotransmission pathways in the brain [8, 9]. It is one of the leading causes of substance use disorders (SUD) and substance-related disorders, and it also contributes to other psychiatric disorders. The World Health Organization (WHO) categorized and published clinical descriptions and diagnostic guidelines for mental and behavioral disorders due to psychoactive substance use [10]. These categories consisted of nine blocks, including the use of opioids, cannabinoids, sedative-hypnotics, cocaine, caffeine, hallucinogens, tobacco, volatile solvents, and multiple drug use and the use of other psychoactive substances.

There will, of course, be expenses associated with therapy, such as the cost of pharmacological treatment, holistic rehabilitation therapy (including physical, psychological, and social therapy), cognitive and behavioral therapy, and random urine drug testing. Therefore, it is critical to have information related to the cost analysis of the treatment to support efficient and successful management of the hospital system. Additionally, this knowledge may be applied to healthcare financing or budgetary planning for the mental healthcare system. Cost analysis of individuals suffering from mental and behavioral problems caused by psychotropic drug usage is therefore critical. According to a cost study conducted in Thailand, occupational therapy expenses were found to be the highest cost [11]. In terms of outpatient drug treatment, Thanyarak Institute's cost analysis research on drug addiction treatment found that the costs of outpatient substance abuse treatment are equivalent to THB 831. When categorized by drug type, it was found that the cost of outpatient services for amphetamines was THB 29,718, while that for heroin and volatile substances were THB 29,397 [12]. Moreover, the study of drug addiction treatment cost accounting in the compulsory treatment system of Thanyarak Khon Kaen Hospital reported the cost of providing treatment for amphetamine addiction was THB 52,854 (unit cost: THB 244.69). The cost of volatile substance treatment was THB 161,863 (unit cost: THB 1,586.89), cannabis treatment was THB 3,003 (unit cost: THB 231), treating ice was THB 2,406 (unit cost: THB 240.60), and the cost per unit of treating two or more substances was around THB 231 [13].

Besides psychiatric hospitals and drug treatment centers, community hospitals and general hospitals are also essential service units in the provision of drug addiction treatment services. It is obvious to see that many outpatients have been extensively getting into the services in these two types of hospitals. Another point of view, there is little academic research evidence published investigating the cost of services among patients with psychoactive and behavioral disorders caused by psychotropic substances in the community and general

hospitals in Thailand. Therefore, the purpose of this study is to determine the overall cost of providing treatments to individuals suffering from mental and behavioral disorders due to psychoactive substance use. We are primarily interested in cost analysis at community and general hospitals, where cost information is officially available and may be used for research. This study analyzed and emphasized the cost of services per visit. The details of services were classified by type of hospital and according to the cost types, such as labour cost, material cost, and capital cost. The analytic findings also demonstrated the total cost and average cost of services per visit. We hope that the findings of this study might be used to support and be a part of the information for financial management in serving these psychiatric patients.

METHODS

STUDY SITE

This cross-sectional study collected officially available cost information, including service data, hospital statistics, and financial information, from four community hospitals and two general hospitals in the fiscal year 2014. The inclusion criteria were: 1) the hospital provides treatment for mental and behavioral disorders due to psychoactive substances use, and 2) the hospital has enough data to calculate outpatient costs.

HANDLING OF DIAGNOSIS DATA

This study used the medical classification codes of the ICD-10 codes to select and process the diagnosis codes of MBDs due to psychoactive substance use [10], including F11-F19: (1) opioid-related disorders (F11); (2) cannabis-related disorders (F12); (3) sedative, hypnotic, or anxiolytic related disorders (F13); (4) cocaine-related disorders (F14); (5) other stimulant related disorders (F15); (6) hallucinogen related disorders (F16); (7) nicotine dependence (F17); (8) inhalant related disorders (F18); (9) other psychoactive substance-related disorders (F19).

COST ANALYSIS

The cost of MBDs due to psychoactive substance use per visit was calculated using two methods: a traditional approach which shows total hospital cost and total hospitals' department cost, and a cost-to-charge ratio, which is a micro-costing method to estimate patients' individual cost, in accordance with the Ministry of Public Health of Thailand's cost analysis [14]

The procedure was composed of the following steps: 1) hospital financial and accounting information in fiscal year 2014 auditing, 2) cost center assignment, dividing hospital departments into two main cost centers which are supporting cost centers (all administrative offices in the hospitals) and service cost centers (all clinics and departments providing care to the patients), 3) direct cost including labour cost (e.g,. salary and fringe benefits) , material cost (e.g., medicine, medical supply), and capital cost (i.e., depreciation from building and equipment, and amortization from software) estimation, 4) Cost allocation from supporting cost center to service cost center to obtain total cost using allocation criteria such as a number of staff, a number of patient, space of office, medical supply expenditure, 5) summing total cost of each service center and total charge by hospital charge groups (e.g,. room and board, medicine, x-ray, doctor fees, 6) combing each charge group with service cost center (i.e., cost of dentistry was total cost from dentist department included labour cost, material cost, capital cost and indirect cost), 7) dividing the total charge of each charge group by total cost of each charge group to obtain the cost to charge ratio 8) calculating the unit cost of outpatient per visit by diving the total cost of mental and behavior disorders due to psychoactive substance use (ICD-10 codes; F11-F19) by a total number of visits. The unit cost in 2014 was adjusted from 2015 to 2021 [15] by the inflation rate from the Bank of Thailand to indicate the current unit cost. The inflation rate was -0.90 in 2015, 0.18 in 2016, 0.0067 in 2017, 0.0107 in 2018, 0.007 in 2019, and -0,0085 in 2020, accordingly.

Descriptive statistics of demographic data were analyzed as a maximum, median, mean, minimum, standard deviation, and interquartile range (IQR) as appropriate. Excel was used to perform data analysis.

ETHICAL CONSIDERATIONS

This study was not conducted on human research subjects or human participants. Data were employed from hospitals' databases based on our data requirements template, which was without personally identifiable information.

RESULTS

CHARACTERISTICS OF THE PARTICIPANTS

Participants from six public hospitals, consisting of two general and four community hospitals, were analyzed. Their average ages were between 29 and 43 years old. The total

utilization per person-year ranged from 2 to 8 visits, with an average utilization per person of 4 visits. The total utilization ranged from 129 to 490 people, with an average utilization of 250 people. Over 90% of patients in each hospital were found to be male (Table 1).

TABLE 1. CHARACTERISTICS OF THE PARTICIPANTS

Hospitals	Total utilization (visit/person)	Total utilization (persons)	Average age		Number of patients			
			Years	SD	Male (cases)	%	Females (cases)	%
A GH	2.27	125.0	42	11.9	259	91.2	25	8.8
B GH	7.66	490.0	43	15.7	3,483	92.8	271	7.2
C CH	5.66	254.0	31	12.4	1,394	96.9	44	3.1
D CH	2.86	169.0	40	11.0	432	89.4	51	10.6
E CH	5.10	143.0	29	8.6	677	92.7	53	7.3
F CH	2.88	321.0	37	13.6	866	93.5	60	6.5
Maximum	7.66	490.00	43	15.7	3,483	96.9	271	10.6
Median	3.99	211.50	39	12.1	772	92.8	52	7.2
Mean	4.41	250.33	37	12.2	1,185	92.8	84	7.2
Minimum	2.27	125.00	29	8.6	259	89.4	25	3.1
Standard deviation	2.09	138.77	6	2.4	1,192	2.5	92	2.5
Interquartile Range	3.00	178.00	11	3.0	962	3.0	16	3.0

Note: GH = General Hospital, CH = Community Hospital

In terms of hospital cost analysis, labour costs were the highest hospital expenditure, except for hospital D. The labour costs were between 50 and 57%, followed closely by material costs (from 37 to 44%), and capital costs (from 4 to 8%). From another point of view, material costs were the highest cost in hospital D, amounting to 51%, followed by labour costs and capital costs, accounting for 45% and 4%, respectively (Table 2).

In the case of outpatient costs for patients suffering from psychoactive substance use disorders, total outpatient costs ranged from 170,907 THB to 1,940,243 THB. Total visits ranged from 284 to 3,754 visits, with an average total visit of 1,269 visits. It was the highest number of visits to hospital B (3,754 visits), followed by hospital C (1,438 visits), and hospital F (926 visits). In 2014, the unit cost per outpatient visit ranged from THB 172 to THB 762. After adjusting for the inflation rate between 2015 and 2021, the unit cost per outpatient visit was estimated to range from THB 204 to THB 905 in 2021.

TABLE 2. HOSPITAL COST INFORMATION

Hospital	Labour cost (%)	Material cost (%)	Capital cost (%)
A GH	55	37	8
B GH	53	41	6
C CH	50	44	6
D CH	45	51	4

Hospital	Labour cost (%)	Material cost (%)	Capital cost (%)
E [CH]	57	38	5
F [CH]	57	39	4
Maximum	57	51	8
Median	54	40	6
Mean	53	42	6
Minimum	45	37	4
Standard deviation	4.67	5.20	1.52
Interquartile Range	7	6	2

Note: [GH] = General hospitals, [CH] = Community hospitals

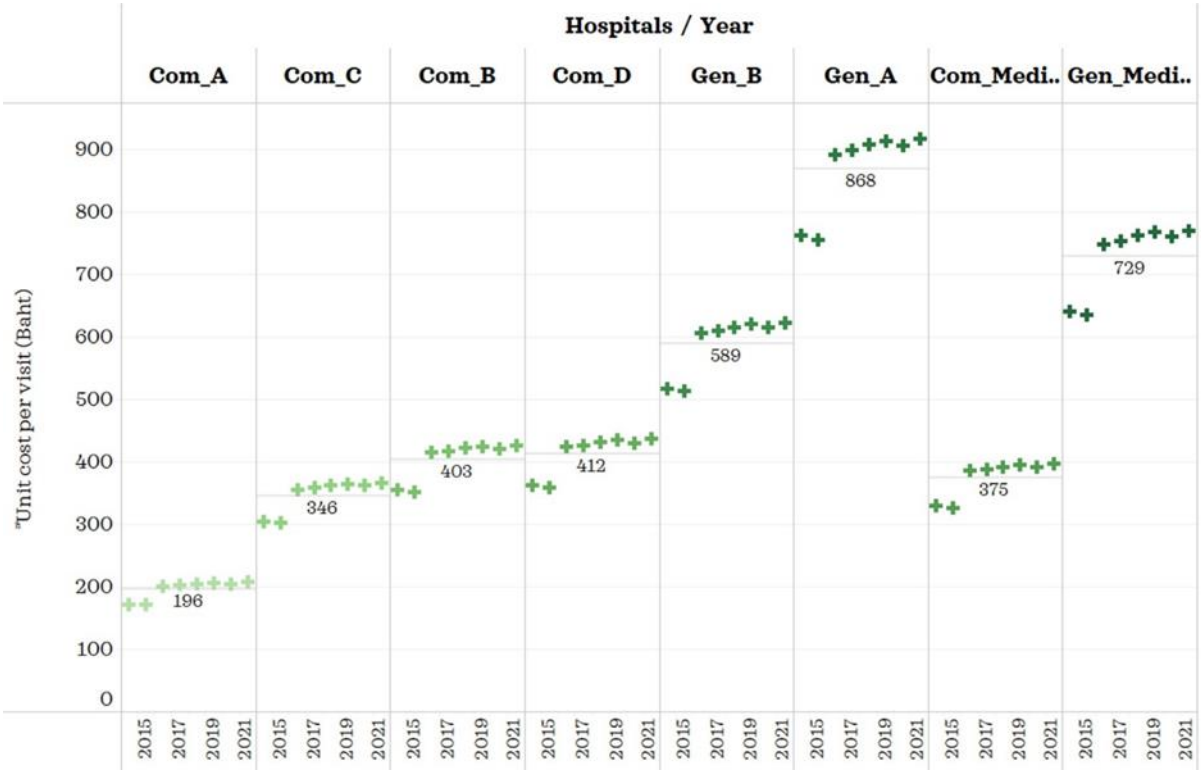
TABLE 3. THE UNIT COST OF OUTPATIENT WITH PSYCHOACTIVE SUBSTANCE USE DISORDER

Hospitals	Total Hospital cost (THB)	Total OPD SUD cost (THB)	Total OPD SUD visits	Unit cost per visit (THB)	
				2014	2021*
A [GH]	468,582,025	216,386	284	762	905
B [GH]	438,834,585	1,940,243	3,754	517	614
C [CH]	128,956,427	246,739	1,438	172	204
D [CH]	178,516,927	170,907	483	354	420
E [CH]	121,254,500	221,768	730	304	361
F [CH]	135,458,726	335,032	926	362	430
Maximum	468,582,025	1,940,243	3,754	762	905
Median	156,987,826	234,253	828	358	425
Mean	245,267,198	521,846	1,269	412	489
Minimum	121,254,500	170,907	284	172	204
Standard deviation	162,947,040.11	696,985.39	1,280.62	204.38	242.79
Interquartile Range	309878158	118646	955	213	253

Note: GH = General hospitals, CH = Community hospitals
SUD = Substance use disorder
*Adjusted by inflation rate from the year 2015 to 2021

The estimation of the unit cost per outpatient visit from 2014 to 2021 in four community hospitals was analyzed, along with the calculation of the median cost of these four hospitals. After adjusting the unit cost per visit in 2014 for inflation from 2015 to 2021, it was found that the trend for these four hospitals was an increase over the past six years, from 2016 to 2021. Hospitals D and F showed a similar unit cost trend, ranging from 414 to 426 THB and 423 to 435 THB, respectively. Hospital E's unit cost ranged from 355 to 366 THB, while hospital C was between 201 and 206 THB. The median cost estimate for these four hospitals was found to be around 385 to 396 THB (Figure 1.)

FIGURE 1. UNIT COST PER VISIT OF PSYCHOACTIVE SUBSTANCE USE DISORDER BY HOSPITALS (GENERAL AND COMMUNITY HOSPITALS) AND YEARS BETWEEN 2014 AND 2021



Notes: Com_A = community hospital A, Com_B = community hospital B, Com_C = community hospital C, Com_D = community hospital D , Gen_A = general hospital A, Gen_B = general hospital B, Gen_median = median of the unit cost of general hospital A and B, Gen_median = median of the unit cost of general hospital A, B, C, and D.

DISCUSSION

PARTICIPANT CHARACTERISTICS

Mental and behavioral problems caused by psychoactive substance use are a set of conditions induced by the use of substances such as cannabis, and other psychoactive substances. These illnesses can have a substantial influence on a person's emotional and physical well-being, causing issues in areas such as personal relationships, the job, and everyday activities. When comparing the occurrence of these disorders among genders, it is apparent that men are more susceptible to experiencing mental and behavioral disorders due to psychoactive substance use than women. This observation is supported by our study, which was evident as over 90% of the patients were male, while only a small proportion of less than 10% was female. This finding is consistent with previous studies indicating that men have a higher incidence of substance-related disorders [16], hazardous drinking, and heavy cannabis use [17], as well as drug and alcohol use or dependence across various age groups, compared to women [18]. Furthermore, males have a higher occurrence rate of nicotine use, cannabis use, and cannabis use disorder than females [19]. Some studies suggest that traditional masculinity [20], socioeconomic status [21], educational level [17], and employment status [17] are all positively associated with excessive substance use.

COST ANALYSIS

The present study estimated the treatment cost of outpatient mental and behavioral disorders due to psychoactive substance use, which are provided services, at six public hospitals (four community and two general hospitals). Our findings revealed that labour costs made up the vast majority of service cost ratios, followed by material costs and capital costs. Similar results were found in other studies, for example, a study of oncology and hematology unit cost analysis in the Netherlands [22], a study of medical service unit costs in five types of hospitals in India [23], and a study of outpatient parenteral antimicrobial therapy costs in Spain [24]. These studies indicated that the highest total cost was found in labour costs or human resources which were highly predictive of unit expenses. In particular, tertiary care and district hospitals in India found that labour

costs were over 60% and 55% of the total costs, respectively.

Our result showed that unit cost per outpatient visit ranged from 172 to 762 THB. Moreover, the unit cost per visit in 2020 and 2021 was less than THB 1,000 after being adjusted for the inflation rate [25]. There were not many studies on psychoactive substance use disorder cost analysis. Similar results were found in studies by Thanyarak Institute [12] and Thanyarak Khon Kaen Hospital [13]. In terms of Thayarak Institute, which was equivalent to a regional hospital type, it indicated that the unit cost per outpatient for substance abuse treatment was THB 831. For Thanyarak Khon Kaen Hospital, which was equivalent to a general hospital, it was found that the unit cost around THB 250 per visit for amphetamine addiction, THB 231 for cannabis treatment, and about THB 231 for substances. This is the study of a cost analysis of SUD using cost accounting in Thailand. Hospital accounting information auditing, and the total cost in this study was the actual cost for one fiscal year. It is indicated that the actual cost of providing care for people suffering from MBDs due to psychoactive substance use at hospitals in Thailand. In previous studies in Thailand, we found that the period of time in the first study was three months, and capital costs were not included in the second study.

Even though substance users who were admitted and received therapy in the inpatient departments have been reported to be more successful in therapy compared to day hospitals, certain study findings have highlighted that outpatient treatments are also considerably more effective than inpatient treatments, especially in the care of alcohol abuse [24]. Our findings show that the unit cost of outpatients for psychoactive substance use disorders in community hospitals and general hospitals is nearly identical to that in drug treatment centers. In terms of delivering mental healthcare services for various types of mental disorders, it was stated that support for expanding services to community hospitals and general hospitals may help alleviate congestion in specialized hospitals or drug treatment institutions. It also enhances community-based drug treatment [26] and access to care for psychiatric and SUD patients in the community. Therefore, the treatment units for psychiatric disorders and psychoactive substance use in community hospitals and general hospitals should be promoted. In the past, community hospitals faced challenges such as a lack of explicit structure for their psychiatric units and drug treatment sections. It is merely a unit under other structural divisions, like outpatients, nursing departments, or the Family Clinical Practice and Community Department. This needs a supportive method of improving mental health care services, specifically the mental health workforce: psychiatrists, psychiatric nurses, clinical psychologists, and so on [27]. However, other perspective points of view on the factors affecting effective remedies, such as biopsychological perspectives, social support dimensions, and the therapeutic intervention approaches provided by healthcare providers [28], should be taken into consideration. These factors influence the cost. Because SUD treatment is complicated and often requires a long-term duration. Encouraging patients to cooperate with continuous treatment can benefit both the patients and healthcare providers in terms of cost-effectiveness.

LIMITATIONS AND FUTURE RESEARCH

The participants of this study were recruited from six public hospitals, composed of four community and two general hospitals. The current findings of the cost analysis provide the initial insights that is able to highlight the unit cost per visit of these hospital samples. However, these findings cannot be generalized to all community and general hospitals. Accordingly, further studies are recommended to recruit more hospitals to improve generalizability. Another interesting perspective is a prospective cohort study investigating the unit cost incurred from the initial treatments to the end of the remedy for each patient. This study may provide invaluable evidence to determine the overall expense required for a patient undergoing the entire treatment process (from the initial treatment to the last treatment). Furthermore, a cost analysis of counseling, drug screening services [29], occupational health therapy, drug treatment, and rehabilitation should be conducted to help develop a plan for providing drug addiction treatment in community hospitals and general hospitals. These are interesting topics for further studies, which might be specifically evidence-supported.

IMPLICATIONS AND ACADEMIC SUGGESTIONS

Our findings demonstrated the unit cost of outpatient psychoactive substance use in community hospitals and general hospitals. This could prove that the unit cost ranges of these hospitals are quite similar to the unit costs of the drug treatment centers. Concerning service costs, it was determined that there are three important components to the high cost of treating psychoactive substance use patients: hospital medical expenses; home medication; and laboratory investigation and pathology. The unit cost and major cost of services should, therefore, be taken into consideration in the planning of the provision of services,

efficient treatment, and rehabilitation for drug users. Moreover, the hospital should consider three fundamental perspectives, such as psychological, medical, and socio-environmental dimensions.

CONCLUSION

Substance dependence has become a serious health burden globally, and Thailand is no exception. From our study, we found that patients experiencing mental and behavioral disorders due to psychoactive substance use were young adults aged between 29 and 43 years old. As this age group is an important workforce in economic development, unless the measures or strategies are taken to reduce this issue, healthcare expenditures will increase significantly. An appropriate intervention is, therefore, required to combat this problem.

Labour costs were the highest ratio of total costs. Manpower is an important issue that needs to be discussed and planned to provide effective services. Increasing patient access to healthcare and treatment is another point of interest. Besides, increasing productivity or increasing the utilization of patient visits can diminish unit costs.

ACKNOWLEDGMENTS

We wish to extend special thanks and appreciation to four community and two general hospitals for providing the cost information. This is the crucial data for this study, which was used to analyze the unit cost of outpatients with mental and behavioral disorders due to psychoactive substance use.

DECLARATION OF INTEREST STATEMENT

No potential conflict of interest was reported by the authors.

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