

Unit Cost of Laboratory Investigation of Division of Dermatoimmunology, Department of Dermatology, Faculty of Medicine Siriraj Hospital

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ABSTRACT

Objective: The objective of this study was to determine the cost of the Division of Dermatoimmunology.

Methods: This was a retrospective study using the database of the Division of Dermatoimmunology, Department of Dermatology including number of investigations, labor cost, material cost, maintenance cost and depreciation cost of durable items and buildings during from 1 January 2011 to 31 December 2011.

Results: The results showed that the total cost of direct immunofluorescence study, indirect immunofluorescence study, skin prick testing, and autologous serum skin testing were 516.80, 431.66, 233.73, and 132.48 Baht, respectively.

Conclusion: This study helped us and the hospital to estimate the unit cost of investigations in the Division of Dermatoimmunology and to fix the price of each investigation.

Keywords: Unit cost, dermatoimmunology, dermatology, investigation

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INTRODUCTION

Medical services consist of several care modalities for patients, for example, diagnosis, laboratory investigations, medical treatment, and patients' physical and psychological rehabilitations. These services aim to assist the patients' recovery from their illness. The additional cost of investigation for diagnosis and medical treatment are important factors that affect the medical plans and the decision of the patients and their families. If the additional investigation for diagnosis and medical treatment rates are too low, the hospital might not be able to manage the available resources for the patients' optimum benefit. On the other hand, if the additional investigation for diagnosis and medical treatment rate are too high, the patients might lose their opportunity for the optimum medical treatment as they might not be able to afford the high medical expense, especially when overall health care expenditure has been gradually rising.

The calculation of investigation for diagnosis and medical treatment rate in the view of the hospital is the calculation of expenses the hospital uses for the investigation, diagnosis and medical treatment processes. The actual cost calculation will help to estimate the expense in advance, which will lead to appropriate budget allocation, resource planning for the optimum benefit, proper financial analysis to improve the service's effectiveness, and the acceptable rate of medical services as well.

Wanichpakdeedeecha R, reported the cost per unit in service in the Department of Dermatology in the fields of Photodermatology and Dermatotomy and a thesis on cost per unit in service analysis in the Department of Dermatology, Siriraj Hospital, Mahidol University.^{1,2} In 2002, Wahichpakdeedeecha R, also reported the cost per unit in service in the field of Dermatoimmunology.³ However after 10 years, the price of direct and indirect costs are higher, so we recalculated the actual expense in each test.

The Division of Dermatoimmunology is a unit in the Department of Dermatology, Faculty of Medicine Siriraj Hospital, Mahidol University. It covers the medical services in cutaneous allergies, vesiculobullous diseases and autoimmune diseases. Up to the present, the number of patients who receive the service has increased. The

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Division of Dermatoimmunology provides additional laboratory investigations for the patients who suffer from vesicubullous diseases and autoimmune diseases, which include direct immunofluorescence study and indirect immunofluorescence study. Direct immunofluorescence study is the laboratory investigation which is to investigate the deposition of immunoglobulins (IgG, IgA and IgM), complement and fibrinogen in various layers of the patients' skin. Indirect immunofluorescence study is to investigate antibodies in the patients' blood. Moreover, our unit also performs other investigations for patients who suffer from urticaria. Autologous serum skin testing is an additional investigation in the patients who are diagnosed as chronic urticaria by injecting the patient's serum on the patient's flexural part of forearm. Apart from these laboratory investigations, skin prick testing is an additional test used in the patients who suffer from acute intermittent urticaria and atopic dermatitis to investigate the substance which causes the allergy of the skin. It is performed by dropping the suspected substances on the patient's flexural part of forearm, and use the needle to prick the skin to introduce allergens into the patient's skin. These investigations are crucial for diagnosis, medical planning and prognosis of diseases. Currently, there is no unit cost study in all four mentioned investigations.

MATERIALS AND METHODS

This research was the descriptive and retrospective study to analyze the cost of additional investigations of the Division of Dermatoimmunology, Department of Dermatology, Faculty of Medicine Siriraj Hospital, Mahidol University from 1 January 2011 to 31 December 2011, which is 12 calendar months. These additional investigations of dermatology were performed in the office hours only; therefore, the patients who appeared after office hours were excluded from this study. In addition, this unit cost calculation was calculated for only the part of service expense charged to patients which is equal to one-third of all the actual costs. The cost of teaching and research was not included. Activity-based costing has been used during the allocation process. Dermatologists were also asked to estimate the average time spent on each specific procedure to use as cost drivers to determine labor cost. The time and effort on the part of nursing and support staff were based on the assumption that the allocation of nursing and support resources parallels that of physician resources.

The calculation was composed of both direct and indirect costs. The direct costs included labor cost, material cost, depreciation cost of durable items and buildings for each investigation.

Labor cost was calculated from income base of July 2012 and calculated for 1 year including salary and other allowances that the faculty paid the officials for the specific investigations. The calculation was performed by calculating the work load in proportion of the time consumed in the specific investigation compared with the time consumed in overall performance in order to be able to distribute labor cost in the actual investigation.

Material cost consisted of costs of substances, solutions used in the investigation, and the medical instruments which can be used less than 1 year, the medical supplies and the maintenance cost of instruments used in the investigations, which were calculated in proportion of each instrument, depending on the quantity of the investigation by calculating in proportion of the quantity of the solutions, medical instruments and supplies for each investigation.

The depreciation cost included durable items and instruments which were high-priced and buildings. The duration of durable items, instruments and buildings were according to users' criteria (e.g. the useful life of the building was taken as 20 years). The calculation of the depreciation was straight method and distributed the depreciation cost of durable items for diagnosis in proportion of each investigation. Each laboratory investigation was performed by using the same durable items and buildings. Hence, the cost of depreciation for each laboratory investigation was different. The depreciation for the building was calculated from annual depreciation of the value of the construction and distributed the building cost to the diagnosis. The area of the investigation was calculated in the depreciation cost per square meter. In addition, the use of the laboratory room for other functions was not included in this study.

The indirect cost included the management cost of Siriraj Hospital, Mahidol University, which were calculated as 10% of all direct costs. The direct cost and indirect cost were then added together.

RESULTS

Our study found that the services of the Division of Dermatoimmunology, Department of Dermatology, Faculty of Medicine Siriraj Hospital, Mahidol University, which were performed from 1 January 2011 to 31 December 2011 were as shown in Table 1. There were 4 laboratory services including direct immunofluorescence study, indirect immunofluorescence study, autologous serum skin testing and skin prick testing. The direct costs included labor cost, material cost, depreciation cost of durable items and buildings for each investigation and maintenance cost which have been shown in Table 2. Table 2 also shows the ratio of labor cost: material cost: capital cost.

TABLE 1. The service of Division of Dermatoimmunology, Department of Dermatology, Siriraj Hospital, Mahidol University (1 January 2011 - 31 December 2011).

Type of investigations	Number of procedures per year
Direct immunofluorescence study	430
Indirect immunofluorescence study	256
Skin prick testing	148
Autologous serum skin testing	98

TABLE 2. The cost of investigations of Division of Dermatoimmunology, Department of Dermatology, Siriraj Hospital (1 January 2011- 31 December 2011).

Cost	Direct Immunofluorescence	Indirect Immunofluorescence	Skin prick test	Autologous serum skin test
Labor cost (Baht)	177.60	175.47	75.88	68.76
Material cost (Baht)	150.76	38.92	132.48	20.70
Maintenance cost (Baht)	46.98	39.24	21.25	12.04
Depreciation cost of durable items and buildings (Baht)	141.47	178.02	4.12	30.98
Total cost (Baht)	516.80	431.66	233.73	132.48
Ratio of labor cost:	34.3:29.17:36.46	40.65:9.01:50.33	32.46:56.68:10.85	51.90:15.62:32.47
material cost: capital cost	1:0.85:1.06	1:0.22:1.23	1:1.75:0.33	1:0.3:0.62

Labor : material : capital cost

DISCUSSION

From the study, labor costs were different in each investigation because the time-consumptions were different. The depreciation cost of durable items of the direct cost of direct and indirect immunofluorescence was higher than that of skin prick testing and autologous serum skin testing. The reason was that the direct and indirect immunofluorescences were laboratory investigations, which needed the high-priced medical instruments; therefore, the maintenance cost was high as well. On the other hand, skin prick testing and autologous serum skin testing are the in vivo testings that are mainly performed on the patients' skin. For these reasons, the cost of high-priced instruments was lower than direct and indirect immunofluorescences, so the cost per unit was also cheaper.

Labor cost in our laboratory investigations are high because each test is a time-consuming test and needs expert scientists who have been trained in specific fields. The ratio of material cost of autologous serum skin test is lower than labor cost and capital cost because autologous serum skin test is in vivo skin test using patients' serum. This test does not need to use high-priced instruments. The skin prick test's material cost is high because of high-priced allergens.

This cost study had a limitation in interpretation because of the variation of the estimated times that each instrument was being used.

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