

HOSPITAL COSTS BUDGETING CONCEPT BASED ON THE ACTIVITY BASED COSTING (ABC) PRINCIPLES

Małgorzata Cygańska

Division of Accounting
University of Warmia and Mazury in Olsztyn

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Abstract

Standard budgeting procedures created for manufacturing enterprises cannot be applied directly to the operation of health care entities as specific service units. Effective implementation and efficient functioning of a budgeting system requires using procedures that fully satisfy the needs of the management. This paper presents methods and principles for budgeting of costs in a hospital based on Activity Based Costing (ABC) principles that could offer a wide range of information useful in a hospital management process.

KONCEPCJA BUDŻETOWANIA KOSZTÓW SZPITALA NA PODSTAWIE RACHUNKU ABC

Małgorzata Cygańska

Zakład Rachunkowości
Uniwersytet Warmińsko-Mazurski w Olsztynie

Słowa kluczowe: metodyka budżetowania, szpital, rachunek kosztów działań.

Abstrakt

Typowe procedury budżetowania, tworzone dla przedsiębiorstw produkcyjnych, nie mogą być wprost przeniesione na obszar funkcjonowania zakładów opieki zdrowotnej jako specyficznych jednostek usługowych. Skuteczne wdrożenie i sprawne funkcjonowanie systemu budżetowania wymaga wykorzystania takich procedur, które w pełni zaspokoją potrzeby kierowniczych kadry zarządzającej. W opracowaniu przedstawiono metody i zasady budżetowania kosztów w szpitalu oparte na rachunku ABC (Activity Based Costing), które mogą być podstawą wielu przydatnych informacji w procesie zarządzania szpitalem.

Introduction

Relatively abundant literature on management provides a relatively wide description of the issues related to implementation of activity based costing in hospitals. However, there are no detailed proposals for Activity Based Budgeting application in such entities (CHAN 1993, RAMSEY 1994, CANBY 1995). In an attempt at filling that gap an attempt was made to improve the methods and principles of costs budgeting at a hospital aimed at improving the level of satisfying the information needs of the management. The proposed costs budgeting methodology is based on Activity Based Costing and it assumes planning the patients' treatment costs according to individual disease units.

The main goal of the paper was to present a new concept of costs budgeting system for a hospital based on the ABC principles. The described budgeting procedure represents the synthesis of the author's experience acquired from studies of subject literature and analysis and assessment of costs budgeting systems applied in selected entities in the province of Warmia and Mazury.

Main assumptions of the hospital costs budgeting concept

The goals and procedure of activities' costs budgeting are similar to the tasks and procedure of the traditional system. The basic difference is the difference in costs planning setups. In case of the ABB the costs are grouped for individual activities and the projected volume of each activity represents the additional and integral part of the budgets (KABALSKI 1997).

According to this concept it is proposed to plan the activities of the department measured by the number of admitted patients with a specific disease and according to activities involved in the patient treatment process. That is determined by the fact that the type of disease and the method of treatment are the major factors determining the level of treatment costs incurred (DURBAJLO-MROWIEC 1998).

The activities involved in implementation of the budgeting system based on activities in a hospital should be represented by:

- identification of processes and activities covered by budgeting,
- linking the activities to costs incurred by the hospital,
- identification of diseases treated at individual departments,
- development of costs planning principles for separated activities,
- training of employees in the new budgeting methodology,
- adjustment of motivation systems to new budgeting principles,
- drafting budget documentation templates.

Development of the budgeting procedure should start with identification of processes and activities occurring in the hospital. As a consequence of the wide range of work involved in system implementation we propose to limit the activities covered by the project to the activities involved in the basic process occurring in the hospital, i.e. patient treatment.

The classification of activities involved in the patient treatment process was done from the logical perspective (Fig. 1) (see GLAD et al. 1995, KARMAŃSKA 2003). That process involves activities related to:

- admission of the sick person to the hospital and department (L_1),
- initial examination (L_2),
- diagnostics (L_3),
- treatment itself (L_4), within which the following activities were identified:
 - medical consultations (L_{41}),
 - diagnostic tests and examinations (L_{42}),
 - procedures (L_{43}),
 - rehabilitation and physiotherapy (L_{44}),
- maintaining the medical documentation (L_5),
- discharge or transfer of the patient to another department (L_6).

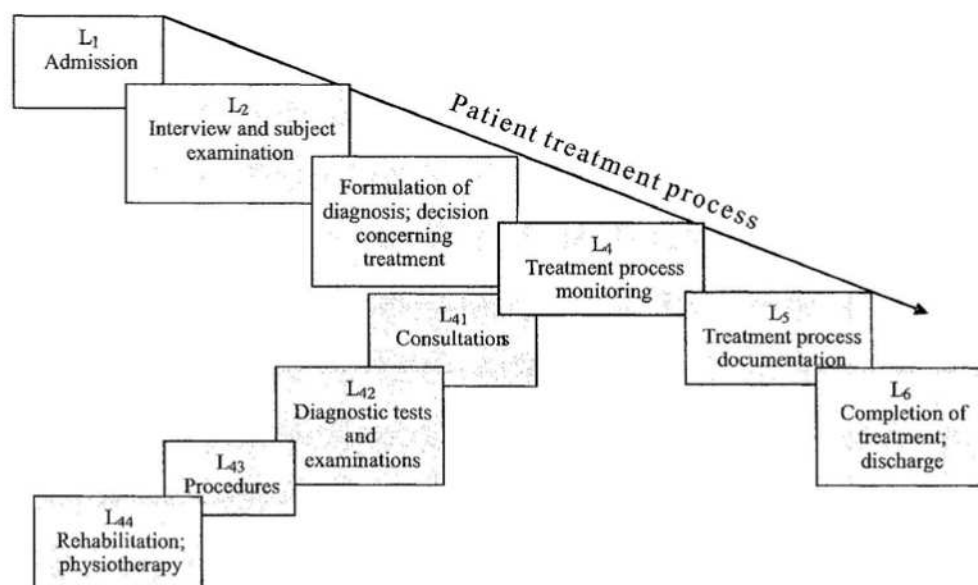


Fig. 1. Classification of activities in the patient treatment process (L) – logical perspective
Source: Own work.

From the costs perspective that format of the treatment process for budgeting needs is unjustified as it requires excessive effort involved in registration of costs incurred for some of the identified activities as compared to the use of information obtained. That applies, e.g. to activities L_2 , L_5 , L_6 .

For the needs of this concept, combining of certain activities is proposed, which results in separating the areas of cost analysis of particular importance from the financial perspective (Fig. 2):

- admission of the patient to the department, including admission of the patient by the admission department – L_1
- performance of image diagnostics – L_{21} ,
- performance of laboratory diagnostics – L_{22} ,
- performance of a procedure – L_{23} ,
- administration of drugs – L_{24} ,
- medical care in the department – L_3 ,
- hotel services to the patient at the department (hotel costs) – L_4 .

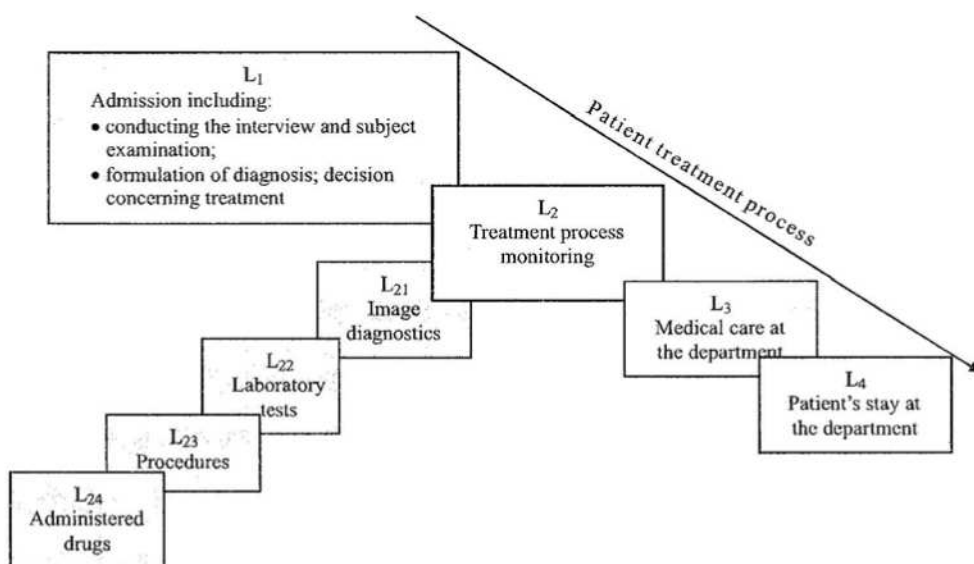


Fig. 2. Classification of activities in the patient treatment process (L) – cost perspective
Source: Own work.

The above proposal focuses on medical activities while generalizing the administrative activities. Acceptance of that solution is a consequence of:

- low level of costs involved in discharge of the patient,
- effective principles of payment for the treatment process by the NHF,
- technical-organizational possibilities of costs recording,
- demand for information by both the medical staff and the hospital management.

In the presented concept the cost centers in the department were identified in the form of the number of patients admitted with the specific diseases. It is proposed to assume the identification of diseases based on the International Classification of Diseases ICD-9 for procedural departments and the International Classification of Diseases ICD-10 for the conservative treatment departments. Depending on the therapeutic profile of the department and the information needs the diseases or procedures within individual classifications can be aggregated or presented in more detail in whichever way is considered necessary.

Aiming at tighter linking of information generated by the system with the principles of health services financing the classification of patients can be also based on the list of medical services required by the NHF¹. That recording of treatment costs would allow precise and current analysis of financial results of the departments by linking the cost centers to the revenues tightly.

It is also possible to record treatment costs for individual diseases according to the uniform patient groups (UPG). That however, requires development of categories of diseases at individual departments, the treatment costs of which are similar and defining the principles for allocating patients to earlier defined UPGs. That is a complicated process that requires time and as a consequence it is not yet applied in practice in Polish hospitals.

The data characterizing the features on one hand and the costs of individual patient groups on the other form the base for defining the UPGs. The set of necessary information on the patients should be processed in a way requiring the minimum work input. It is recommended that it should contain information on patient age, gender, admission mode, discharge mode, primary disease, secondary diseases, and medical procedure according to the applicable classification.

Planning and effective control of patient treatment costs in case of a specific disease can be done only in case of appropriate linkage between consumption of resources and individual activities. Table 1 presents the

¹ The list of health services is provided in the catalogue of hospital services that forms appendix 1 to the "Detailed information materials on the subject of proceedings in the case for award of contracts for providing health services of the type: hospital treatment" approved in the regulation number 15/2005 by the President of the National Health Fund of February 10, 2005 on approval of the "Detailed information materials on the subject of proceedings in the case for award of contracts for providing health services of the type: hospital treatment".

proposed linkages between the patient treatment process and the costs incurred at the department, at medical service units and non-medical service units and administration. The proposed solutions consider the technical-organizational capacity of hospitals and are based on already partially implemented solutions in the field of costs recording and accounting.

For budgeting purposes, both the department costs and the costs of auxiliary activities should be accounted for per patient with a specific disease according to the identified activities (table 1).

The costs of individual centers should be divided into variable and fixed costs. The variable costs dependent on the volume of services provided determined by the number of patients and person-days of treatment include mainly the value of medical materials used and the value of medical drugs administered. The fixed costs are those the amount of which does not depend on the volume of medical services provided. They include, e.g. the costs of maintaining individual organizational units².

This concept assumes that the costs of individual activities in the treatment process of a patient with a specific disease will be determined at the level of costs of a given department and variable costs of standard service centers. The department fixed costs (excluding medical personnel remuneration costs), service centers fixed costs and administration costs treated as costs of operation and servicing a given department will not be allocated to individual disease units. That is a consequence of lack of a parameter reflecting the logical cause and effect relation between those costs and the identified diseases.

The principles of allocating the costs of permanent medical service centers to individual departments are determined by the assumed costs calculation methods and can be based partly on currently applied solutions.

Department costs budgeting should start with planning the number of patients representing a specific disease according to the accepted classification taking into account the average treatment time expressed by person-days³. That represents the starting point for planning the costs incurred in performance of activities forming the treatment process in case of specific disease units.

During the first year of system implementation, it is recommended to plan the costs of performance of individual activities based on the historical or standard data by applying the "from zero" method. During the transition the incremental method can also be applied to allow gradual establishment of standards and technical standards for performance of specific activities.

² Classification of costs into variable and fixed should be done individually at individual hospitals by department and service center. That is the consequence of the fact that variability of costs in individual units within responsibility centers is not identical. See Kujawska 2004.

³ In subject literature advanced methods for estimating the health needs are identified in the form of: epidemiological, comparative and corporate methodologies. See Topór-Mądry et al. 2003.

Table 1

Matrix of links between costs and identified activities within the patient treatment process

Disease according to the effective classification		Department			Medical service units							Non-medical service units				Administration
		Drugs	Payroll	Other costs	Admission department	Operations theater	Anesthesiology	Image diagnostics lab.	Laboratory	Pharmacy	Sterilization	Kitchen	Laundry	Boilers	Technical division	
Admission	L ₁				KZ											
	Image diagnostics							KZ								
Treatment process	Laboratory tests								KZ							
	Procedures					KZ	KP									
	Administered drugs	KRZ														
Medical care	L ₃		KP													
Patient's stay at the department	L ₄			KZ								KZ	KZ			
Department operation and servicing costs	L ₅			KS	KS	KS		KS	KS	KS	KP	KS	KS	KP	KP	KP

(KRZ – actual costs, KZ – variable costs, KS – fixed costs, KP – full cost)

Source: Own work.

Admission of a patient to the hospital consists of numerous activities performed by the physician on duty. The most important of them include registration and establishment of medical documentation, assessment of the patient's health status, performance of initial diagnostic tests and examinations, taking the decision concerning treatment and nursing activities, preparation of the patient for transfer to a department or discharge for home. It is recommended to allocate the variable costs incurred at the admissions department to the patient with a specific disease on the basis of the chart of medical-nursing procedures carried out at the admissions department and the Patients' Medical Chart⁴. That allows determining the treatment costs by applying accrual calculation at the level of real material and personal outlays.

Methodology for calculating the costs of activities forming the patients' treatment costs

Budgeting the costs of admitting patients with identified diseases can be carried out according to the formula presented below⁵.

Costs of patients' admission to the hospital:

$$BL10_{li} = kz_{pi} \cdot n_i; \quad i = 1, 2, 3, \dots, m, \quad (1.1)$$

where:

- m – number of diseases identified within the frameworks of ICD-10 classification;
- $BL10_{li}$ – budgeted activity cost: admission of patient with i -disease according to ICD-10 classification to the hospital;
- kz_{pi} – unit variable (standard) cost of admission of a patient with a specific disease determined by the "from zero" method according to medical procedure standard or on the basis of historical data;
- n_i – planned number of patients with a specific disease established on the basis of epidemiological or historic data.

It is proposed that the costs of image diagnostics, laboratory tests and procedures should be allocated to treatment processes for individual diseases using the division calculation with weights after earlier allocation of points to the services rendered reflecting the differences in material and labor intensity.

⁴ Patients' Medical Chart contains all the information on the process of treatment of a patient with a specific disease. See Grubecki 2003.

⁵ Aiming at differentiation between the treatment process of patients in procedural department and conservative department it is proposed to assign index 9 or 10 to individual activities according to ICD 9 or ICD 10. In this concept the basic cost planning formulas for individual activities were assigned index 10 values as they take into consideration the specifics of treatment in a conservative department.

The presented solutions assume then that the number, and as a consequence the costs of image diagnostics activities, laboratory tests and procedures depend on the number of patients with a specific disease unit.

Budgeting the costs of the above activities can be done on the basis of the following formulas.

Cost of image diagnostics

$$BL102_{1i} = po_i \cdot kp_o \cdot n_i; \quad (1.2)$$

where:

$BL102_{1i}$ – budgeted activity cost: image diagnostics of patients with i -disease unit according to the ICD – 10 classification;

po_i – planned (standard) number of points, reflecting the cost intensity of image diagnostics necessary for the patient with i -disease according to the ICD – 10 classification;

kp_o – planned cost of performance per one point of image diagnostics.

Other symbols as in formula 1.1.

Cost of laboratory tests:

$$BL102_{2i} = pl_i \cdot kp_l \cdot n_i; \quad (1.3)$$

where:

$BL102_{2i}$ – budgeted activity cost: laboratory tests of patients with i -disease unit according to the ICD – 10 classification;

pl_i – planned (standard) number of points, reflecting the cost intensity of laboratory tests necessary for the patient with i -disease according to the ICD – 10 classification;

kp_l – planned cost of performance per one point of laboratory tests.

Other symbols as in formula 1.1.

Cost of procedures:

$$BL102_{3i} = pp_i \cdot kp_p \cdot n_i; \quad (1.4)$$

where:

$BL102_{3i}$ – budgeted activity cost: procedures applied to patients with i -disease unit according to the ICD – 10 classification;

pp_i – planned (standard) number of points, reflecting the cost intensity of procedures applied to patients with i -disease unit according to the ICD – 10 classification;

kp_p – planned cost of performance per one point of procedures;

Other symbols as in formula 1.1.

The costs that accompany every procedure are the costs of anesthesiology services including drugs and equipment. The method of budgeting for anesthesiology costs depends on the accepted solutions concerning the methods of financing them. In case that financing is subject to a separate contract in the hospital it is possible to allocate the full cost of that service to the patient on the basis of the invoice received⁶. In other circumstances those costs are treated in the same way as the costs of the operations theater.

Drugs and payroll that represent 10% and 55% of all department costs have been separated from the direct department costs⁷. As a consequence, it is important to monitor them on current bases during budget implementation. It is proposed to add drug costs to the costs of treatment on the basis of the Patient's Medical Chart. That operation is greatly facilitated if the IT module "Hospital pharmacy" that allows almost automatic assessment of the value of drugs issued to specific patients functions in the hospital.

The formula used to determine the value of drugs necessary to treat a patient with a specific disease is presented below.

Cost of drugs issued:

$$BL10_{24i} = kz_{li} \cdot o_i; \quad (1.5)$$

where:

- $BL10_{24i}$ – budgeted value of drugs administered to patients with i -disease unit according to the ICD – 10 classification;
- kz_{li} – value of drugs administered daily to a patient with i -disease unit determined by the "from zero" method according to the standards of medical procedure or on the basis of historical data;
- o_i – planned number of person-days for of patients with i -disease unit at the department.

The medical personnel payroll costs that reflect the medical service provided at the department can be added to individual disease units depending on the nature of the doctors' work on the basis of the:

- person-days number the patient stays at the department;
- real time devoted to a specific patient⁸.

⁶ That option was assumed for the purpose of the described budgeting concept.

⁷ Internal materials of C hospital, unpublished.

⁸ In the investigated hospitals it is possible only in case of procedural departments where it is possible to determine the time devoted to a specific patient during performance of the procedure.

Cost of medical care:

$$BL10_{3i} = kz_{oi} \cdot o_i; \quad (1.6)$$

where:

$BL10_{3i}$ – budgeted cost of medical care for the patients with i -disease unit according to the ICD – 10 classification;

kz_{oi} – cost of medical care for one patient with i -disease unit during one day determined on the basis of the payroll levels of doctors and nurses working at the department⁹;

Other symbols as in formula 1.5.

The presented budgeting procedure assumes that the costs of hotel stay of the patient with a specific disease unit depend on the number of person-days of stay. That cost includes the variable costs of the department (excluding the cost of administered drugs) as well as variable costs of the laundry and kitchen.

The formula for planning those costs is presented below.

Cost of hotel stay:

$$BL10_{4i} = kz_{hi} \cdot o_i; \quad (1.7)$$

where:

$BL10_{4i}$ – budgeted hotel costs for patients with i -disease unit according to the ICD-10 classification;

kz_{hi} – cost of hotel stay of the patient at the department for one day.

Other symbols as in formula 1.5.

As mentioned earlier, the treatment costs for individual diseases will not be increased by the costs of maintaining and servicing the department. Their level can be set globally for the entire organizational unit considering:

- fixed costs of the department (excluding medical personnel payroll), admissions department, operations theater, laboratories, pharmacy, kitchen and laundry,
- costs of full sterilizations, boiler rooms, technical department and administration.

⁹ In case the doctors (this applies in particular to procedural specializations), are paid on the basis of contracts made according to which the remuneration depends on the number of procedures performed or their work time, the costs of medical care will be determined at the level of nurses' payroll as the payroll of doctors should be included in the cost of the procedure.

Conclusions

1. The presented budgeting principles allow determining the relation between the costs and the number of provided medical services and time of hospitalization. Additionally, they provide information on the type and volume of resources consumed in the form of administered drugs, performed diagnostic procedures per disease unit and indicate where reductions of costs could be searched for – e.g. in a change of the profile of the department activities (shifting from worse paid procedures to better paid procedures), shortening the hospitalization time or decreasing the number of diagnostic procedures performed.

The other advantages of the described system include:

- the possibility of adjusting the department activity profile to the number and value of services contracted with the National Health Fund;
 - obtaining information necessary for assessment and analysis of costs linked to provision of specific medical services;
 - separating treatment process monitoring costs and costs of patient's stay at the hospital (so-called hotel costs) from patient treatment costs, which can be considered the initial stage in preparation of the hospital for cooperation with private insurance companies;
 - identification of particularly cost-intensive areas in the patient treatment process;
 - possibility of direct comparison between the price set by the National Health Fund for treatment of a specific disease unit and the costs incurred by the hospital;
 - current control of performance of budget assumptions including identification of areas where the deviations are the largest;
 - identification of persons responsible for individual stages of the treatment process, which allows development of a motivation system encouraging the employees to search for new solutions streamlining the work and limiting the costs – of course where possible only.
2. The difficulties with application of the presented budgeting concept can appear at the stage of specifying the disease units for individual departments. Inconsistency of the system of medical services developed by the National Health Fund for the purpose of financial settlements with the existing and generally effective classifications such as the international ICD-9 or ICD-10 classifications represents an additional limitation.
 3. The described budgeting concept requires defining the diagnostic-therapeutic procedure standards for all disease units treated in a given hospital. Considering individual, frequently differentiated practices of doctors, this task can prove difficult to complete.

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