Activity-based costing for health care institutions

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Abstract

Situation on global markets, which is changing dynamically, the field of medical services included, makes managers to be forced to constantly seek new and effective methods and management tools. Basic knowledge of the management should be provide by cost information. It is important to apply such a costing model, which would help to provide useful information about the type and amount of used resources and reduction possibilities. The paper presents a proposal of a model accounting for the costs of a selected primary care clinic. The process cost of patient serving will be analyzed, whereas the activity based costing method will be used.

Keywords: Activity-based costing, costs, activities, resources, health care.

1. Introduction

Health care institutions operate in conditions of high volatility environment. The present trend of change is leading to an increase of competitiveness of the health care industry, an increase of health care needs, as well as a rise of expectations of patients and payers.

Situation on global markets, which is changing dynamically, the field of medical services included, makes managers to be forced to constantly seek new and effective methods and management tools. Basic knowledge of the management should be provided by cost information. Information obtained on the basis of traditional models of cost accounting - full cost accounting and variable cost accounting - are now insufficient. It is therefore important to apply such a costing model, which would help to provide useful information about the type and amount of used resources and reduction possibilities.

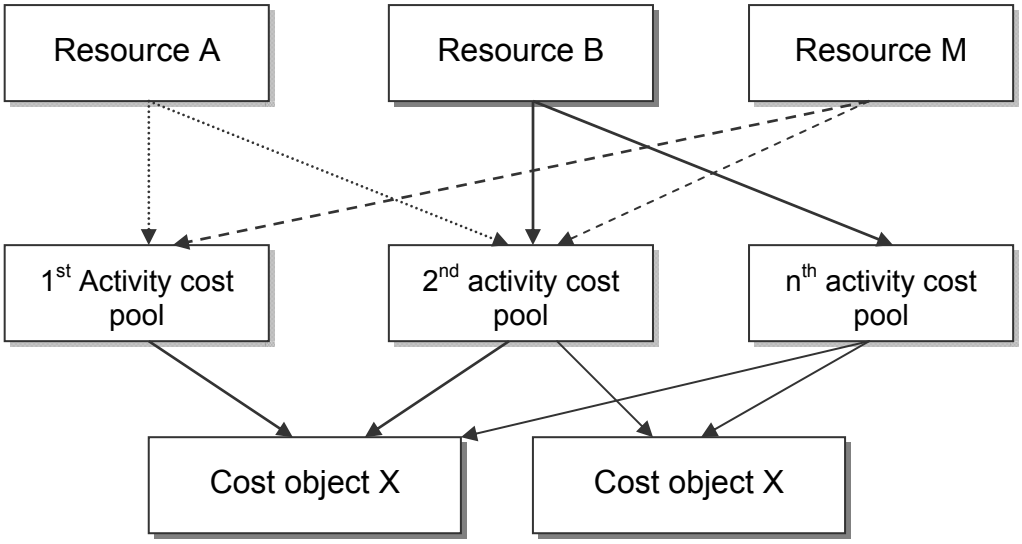
It is also worth noting that Polish health care system is usually negatively assessed by patients and journalists. Its offer is much less attractive than in most western countries and most people have the feeling the lack of money is only one of the reasons, that a wrong cost management is here much more “guilty”. The nurses and doctors complain that the price offered for certain procedures by the National Care Fund is completely unrealistic. Many anecdotes are repeated, e.g. that if a patient has two diseases which could be healed in one surgery, it is more profitable for hospitals to operate him twice instead of one time. Or patients spend several days in hospitals to undergo some examinations for which a few hours’ visit would be enough, but it is profitable for the hospital to keep the patient several days. Nurses say that nobody counts the cost of computer (in their opinion

overwhelming useless) reports they have to prepare and the cost of the fact that while typing in the data, they are not with the patients. All these discussions and complaints are possible, because the cost of individual activities, procedures, days spent in hospital by patients, hours spent by the nurse in front of the computers is in fact completely unknown.
The paper presents a proposal of a model accounting for the costs of a selected primary care clinic. The process cost of patient serving will be analyzed, whereas the activity based costing method will be used.

2. Methods

The model accounting for the costs of a selected ambulatory care clinic based on activity-based costing (ABC) will be presented. This method was developed in the late eighties of the twentieth century by two American professors, Robin Cooper and Robert Kaplan.
The concept of activity based costing is based on the assumption that the direct cause of the costs action, activities. Implementation of these actions results in consumption of resources, which are a quantitative reflection of the cost (Piechota, 2005). In the literature you can find many examples of cost calculation according to the ABC model. In most of them a two-stage model of cost accounting is used, the idea of it is presented in the following Figure 1. It is required to explain terminology used in it to discuss the rules governing the model. The key notation of the concept of activity based costing is a cost object, which is the object for which the cost is collected and counted. Depending on the needs of decision-maker the object may be a product, order, contract, supplier, customer, etc. Another word or phrase in the presented model is a activity cost driver. Each action has its own unique cost driver. The driver is a cost measure of use of discrete activities by cost objects. It is worth noting that the action is defined as the set of operations performed in the unit, which are useful from the viewpoint of cost accounting purposes. In the model there is also the notion of the resource costs driver (resource cost driver). The resource cost driver is a measure of the amount of resources used or consumed by each operation. This should be the size, which most adequately reflect the commitment of resources in the performance. Resources are defined as economic elements, which are used to perform actions (Gierusz, Cygańska, 2009).
In the first stage of accounting an indirect costs according to the ABC method, costs are assigned to actvities using the resource cost drivers. In the second stage, the costs of individual activities (cost pools) are accounted for cost objects using the activity cost drivers.

Figure 1: Resources – Activities – Cost objects
Source: Own work based on (Piechota, 2005).



Application of activity based costing in the healthcare system may be helpful in the planning process, effectively promoting the process of budgetary management. Information obtained under this account may be used, inter alia, for:

- assessing the degree of resource consumption (also in the process of planning the resource consumption),
- dividing resources between organizational units,
- analyzing the variations occurring between plan and reality,
- more effective performance measuring, identification of activities that add value and that do not add value (Cinquini, Miolo Vitali, Pitzalis, Campanale, 2009).

Moreover, the extent of the health care and diversification of the provided services meet the requirements of the application of the concept of activity based costing.

3. Basic features of the proposed model

The costing model proposed for the ambulatory care clinic will be destined only for management purposes, it will not be possible to use it for external reporting purposes, as it will not comply with the Polish law concerning financial reporting. The cost will be calculated for various categories of clients (patients), for different medical procedures, for the treatment of different diseases etc. The results will be compared to the price the National Health Found pays for one patient or for one medical procedure. It will also be analyzed whether the new system will be really helpful to the clinic management ad whether the cost of its implementation and maintenance will not exceed its advantages. The proposed model will also be used to try to indentify inefficient or useless activities. Such results are always a co-product of the construction of an ABC model, as it always involves detailed interviews with the employees of the organization in question (in our case with doctors, nurses, receptionists, administrative staff), close observations of the organization functioning (we have been doing this for a considerable period of time already) and a study of internal documents (which have been put at our disposal).

4. Costing models for health care institutions

In the literature there exist many ABC models for health care institutions. In case of health care institutions the cost objects may be a disease, a homogeneous group of patients, a medical procedure, a doctor etc. However, all the models known to the authors concern hospitals or inpatients clinics. There are no costing models for ambulatory care clinics (i.e. outpatient clinics). And such institutions differ from hospitals as far as the activities and costs objects are concerned. Different cost drivers are also needed. The authors have been investigating an ambulatory care clinic on Poland, who has agreed to try out a new costing system, as the traditional one is no longer adequate to the management needs. The aim of the paper is to propose a costing model based on the ABC method for the ambulatory care clinic in question and to compare it to the present system in terms of management needs.

The next part of this paper presents the calculation of unit cost of internal medicine clinic patients using the method of activity-based costing. At the beginning of work on constructing a model of activity based costing, the items that are subject to calculation procedure were identified, in other words: direct and indirect costs of the analyzed Internal Medicine Clinic were separated (Table 1). Direct costs will not be subjects in the calculation procedure, because they can be unequivocally attributed to the patient. The second group of costs, i.e. indirect costs, will have to be calculated, because it is not possible to unambiguously assign them to patients.

Table 1. Direct and indirect costs of the analyzed Internal Medicine Clinic.
Source: Own work. Monthly data in the Polish currency.

Direct cost	**59 093,95**
Drugs and medical materials	7 751,23
Chemical reagents and diagnostic materials	366,92
Medical equipment used once	238,53
Fuel, oil, gas	226,65
Stationery	262,05
Other materials	19,39
Maintenance and repair – not medical equipment	48,20
Foreign Medical Services	42 623,17
Postal services	87,81
Banking	314,55
Consulting services	5 040,00
Others (such as legal)	260,51
Car Service	42,17
Court fees and other	200,10
Other benefits	600,00
Missions	746,24
Property insurance and other	206,93
Representation and advertising	59,52
Indirect costs	**69 868,57**
Materials for repairs and other	48,81
Prints	593,82

Cleaning supplies	332,49
Telephone and computer	488,56
Hire, rent, lease	13 496,48
Other services (material and non material)	96,83
Salary (personal)	35 372,80
Salaries (impersonal)	10 392,99
Salary related	6 150,84
Clothing (protective and working)	283,13
Others	2 611,83

In the next stage of the model, core activities implemented in the analyzed Internal Medicine Clinic were identified, as well as ancillary activities (support) of the Department of Health Care (Figure 2). The next step after the separation of activities was to assigne to them direct and indirect costs, which is presented in the form of a resources - activity matrix (Table 2). Indirect costs were allocated to individual actions using the resources activity shown in Table 3. Presented model only refers to the process of treating a patient is the basic processes which includes:

- Patient registration
- Interview and physical examination
- Imaging study (eg USG)
- Laboratory study
- Diagnostic test
- Perform medical procedures
- Administration of vaccines
- Home visits
- Administrative activities.

Figure 2. Cost allocation model for a hearth care institutions.
Source: Own work.

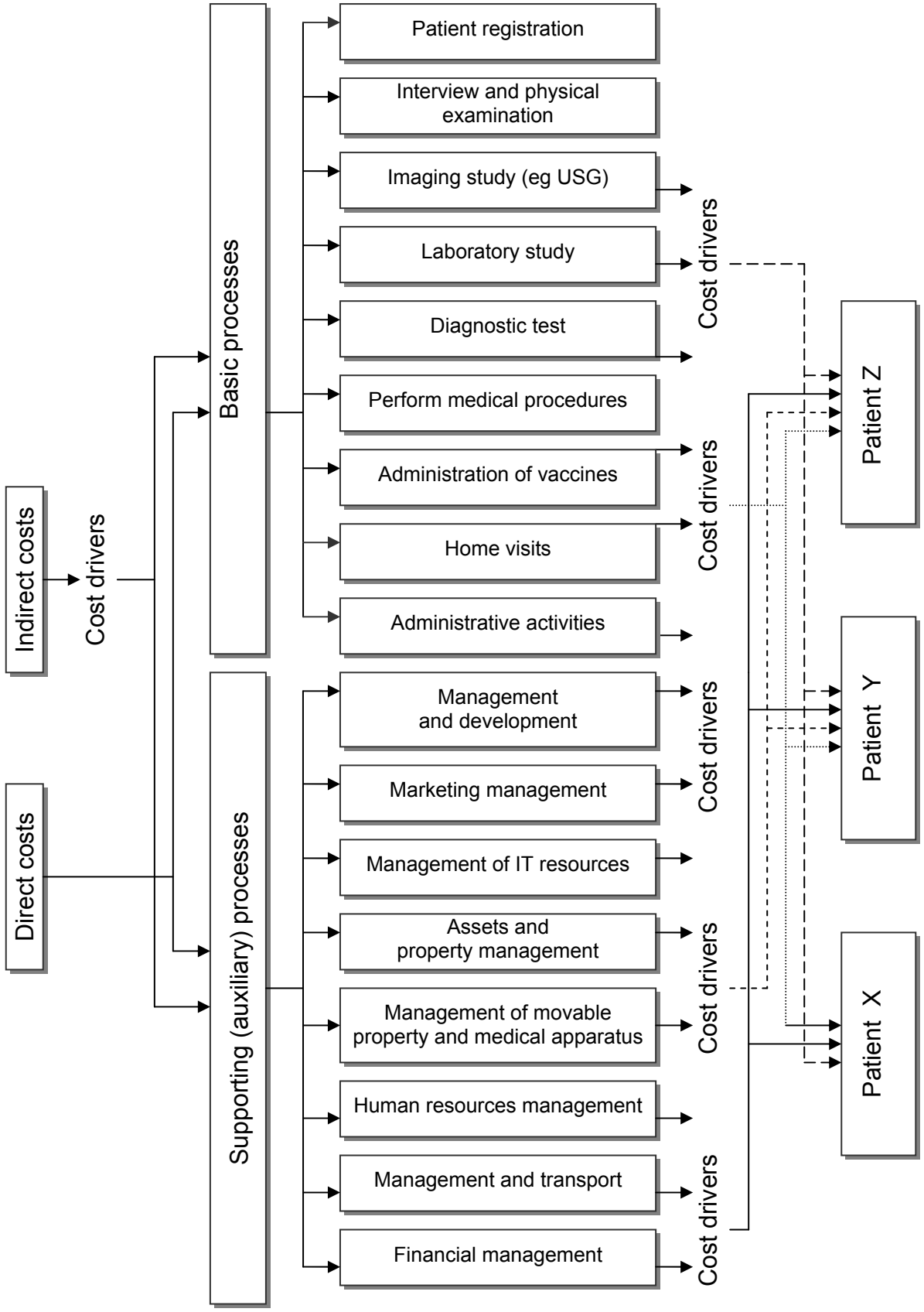


Table 2. Resources – activity

Source: Own work.

Resources \ Activity	Patient registration	Interview and physical examination	Imaging study (eg USG)	Laboratory study	Diagnostic test	Perform medical procedures	Administration of vaccines	Home visits	Administrative activities
	L1	L2	L3	L4	L5	L6	L7	L8	L9
Drugs and medical materials						X	X	X	
Chemical reagents and diagnostic materials						X		X	
Medical equipment used once						X		X	
Fuel, oil, gas						X			
Stationery	X								X
Other materials						X			
Maintenance and repair – not medical equipment	X						X		
Foreign Medical Services		X		X	X	X			
Postal services							X		X
Banking									X
Consulting services									X
Others (such as legal)						X			
Car Service						X			
Court fees and other									X
Other benefits									X
Missions						X		X	X
Property insurance and other									X
Representation and advertising									X
Materials for repairs and other			X	X		X	X		
Prints	X	X	X	X	X	X	X	X	X
Cleaning supplies	X	X	X	X	X	X	X		
Telephone and computer	X	X	X	X	X	X	X		X
Hire, rent, lease	X	X	X	X	X	X	X		X
Other services (material and non material)				X	X				
Salary (personal)	X	X	X	X	X	X	X	X	X
Salaries (impersonal)	X	X	X	X	X	X	X	X	X
Salary related	X	X	X	X	X	X	X	X	X
Clothing (protective and working)	X	X	X	X	X	X	X	X	X
Others	X	X	X	X	X	X	X	X	X

Table 3. Resources cost driver

Source: Own work.

Resources	L1	L2	L3	L4	L5	L6	L7	L8	L9	Key
Materials for repairs and other	-	-	30	20	-	40	10	-	-	estimate on the basis of judging (%)
Prints	15	10	15	15	5	15	5	2	18	estimate on the basis of judging (%)
Cleaning supplies	5	10	20	20	5	20	20	-	-	estimate on the basis of judging (%)
Telephone and computer	20	10	10	10	20	10	10	-	10	estimate on the basis of judging (%)
Hire, rent, lease	5	5	55	5	5	15	5	-	5	estimate on the basis of judging (%)
Other services	-	-	-	40	60	-	-	-	-	estimate on the basis of judging (%)
Salary (personal)	5	30	10	10	5	5	5	15	15	estimate on percent of the time working (%)
Salaries (impersonal)	5	30	10	10	5	5	5	15	15	estimate on percent of the time working (%)
Salary related	5	30	10	10	5	5	5	15	15	estimate on percent of the time working (%)
Clothing (protective and working)	5	30	10	10	5	5	5	15	15	estimate on percent of the time working (%)
Others	10	10	10	10	10	10	10	10	20	estimate on the basis of judging (%)

The final level of costs (after accounting for indirect costs) are presented in Table 4.

Table 4. Total costs of activity.
Source: Own work.

Activity	Direct cost	Indirect cost	Total cost
L1: Patient registration	294,53	3 763,56	4 058,09
L2: Interview and physical examination	25 038,80	16 680,80	41 719,60
L3: Imaging study (eg USG)	0,00	13 123,29	13 123,29
L4: Laboratory study	8 708,07	6 437,22	15 145,29
L5: Diagnostic test	8 358,50	3 762,27	12 120,77
L6: Perform medical procedures	1 866,77	5 162,06	7 028,83
L7: Administration of vaccines	7 627,94	3 724,23	11 352,17
L8: Home visits	705,03	8 074,71	8 779,74
L9: Administrative activities	6 494,31	9 140,43	15 634,73

In a further step the cost objects, which include internal medicine clinic patients, were specified. The principle is that the patient may benefit from one action or several actions simultaneously. For example, patient type 2 uses two activities: “Patient registration”, “Interview and physical examination” and “Administrative activities” while patient type 3 uses 4 three activities: “Patient registration”, “Interview and physical examination”, “Imaging study (eg. USG)” and “Administrative activities”. In all types of patient ther will always be two actions, labeled L1 and L9. Administrative activities include for example: the patient's disease history, medications taken.

The model distinguishes 15 types of patient, namely:

Type 1: Patient registration + Administrative activities

Type 2: Patient registration + Interview and physical examination + Administrative activities

Type 3: Patient registration + Interview and physical + Imaging study (eg USG) + Administrative activities

Type 4: Patient registration + Interview and physical examination + Laboratory study + Administrative activities

Type 5: Patient registration + Interview and physical examination + Diagnostic test + Administrative activities

Type 6: Patient registration + Interview and physical examination + Perform medical procedures + Administrative activities

Type 7: Patient registration + Interview and physical examination + Administration of vaccines + Administrative activities

Type 8: Patient registration + Interview and physical examination + Diagnostic test + Perform medical procedures + Administrative activities

Type 9: Patient registration + Home visits + Administrative activities

Type 10: Patient registration + Imaging study (eg. USG) + Administrative activities

Type 11: Patient registration + Laboratory study + Administrative activities

Type 12: Patient registration + Diagnostic test + Administrative activities

Type 13: Patient registration + Perform medical procedures + Administrative activities

Type 14: Patient registration + Administration of vaccines + Administrative activities

Type 15: Patient registration + Diagnostic test + Perform medical procedures + Administrative activities

After allocating the costs to activities, the unit costs were calculated. Unit cost has been appointed on the basis of the number of patients who benefit from activity. The activity cost object was the number of patients - within one month (Table 5).

Table 5. Unit costs of activity.
Source: Own work.

Activity	Total cost	Number of patients	Unit costs
L1: Patient registration	4 058,09	2298	1,77
L2: Interview and physical examination	41 719,60	875	47,68
L3: Imaging study (eg USG)	13 123,29	246	53,35
L4: Laboratory study	15 145,29	397	38,15
L5: Diagnostic test	12 120,77	295	41,09
L6: Perform medical Procedures	7 028,83	177	39,71
L7: Administration of vaccines	11 352,17	221	51,37
L8: Home visits	8 779,74	87	100,92
L9: Administrative activities	15 634,73	2298	6,80

In the next step, it was necessary to develop a activity – cost object matrix. To accomplish this step of calculation, the previously presented information were used (Table 6). The results of these calculations are presented in Table 6. They can form the basis for the analysis of Internal Medicine Clinic.

Table 6. Unit cost of treating a patient specific type.
Source: Own work.

Activity / Cost object	Patient registration	Interview and physical examination	Imaging study (eg USG)	Laboratory study	Diagnostic test	Perform medical procedures	Administration of vaccines	Home visits	Administrative activities	Total
	L1	L2	L3	L4	L5	L6	L7	L8	L9	
Unit cost	1,77	47,68	53,35	38,15	41,09	39,71	51,37	100,92	6,80	
Patient type 1	1								1	8,57
Patient type 2	1	1							1	56,25
Patient type 3	1	1	1						1	109,60
Patient type 4	1	1		1					1	94,40
Patient	1	1			1				1	97,34

type 5										
Patient type 6	1	1				1			1	95,96
Patient type 7	1	1					1		1	107,62
Patient type 8	1	1			1	1			1	137,05
Patient type 9	1							1	1	109,49
Patient type 10	1		1						1	61,92
Patient type 11	1			1					1	46,72
Patient type 12	1				1				1	49,66
Patient type 13	1					1			1	48,28
Patient type 14	1						1		1	59,94
Patient type 15	1				1	1			1	89,37

Activity based costing can be helpful with calculation of actual unit cost of treating a patient. It also allows to determine the cost of activities which are not directly related to medical activities, such as for example activities made for administrative purposes (patient's medical history follow up). It also provides useful information about the type and quantities of used resources and identifies possible sources of cost reduction, while maintaining the quality of provided services. Model for accounting indirect costs based on activity based costing can provide a stable basis for making managerial decisions in medical subjects.

Implementation of activity based costing in health care institutions requires not only changes so far used by the calculation procedure, but also changes the way of their organizations' functioning. In order to activate the activity based costing we need a lot of information. The process of collecting data for the system is expensive and time-consuming. Furthermore, during the implementation of new cost accounting system for health care institutions, managers may encounter resistance from employees, which can lead to a slowdown of work.

Problems with using the ABC model may also occur when defining cost objects, for example: groups of patients, ongoing projects, organizational units, etc. A challenge is also the choice of costs drivers, on which depend the result of calculations performed.

Despite the disadvantages of activity based costing this model generates more reliable and more accurate information than traditional costing models. Health care institutions, functioning in the conditions of growing competition and contracting by the National Health Fund of health services, are forced to keep searching for new, efficient management support tools and methods. The cost calculation described in this article reflects the structure of the costs incurred by the healthcare units to a degree greater than the traditional models.

5. Conclusions

Health care institutions operating in conditions of increased competition, rising health care needs, rising expectations of patients and taxpayers, are forced to seek new management methods and reducing costs.
One of them could be an activity based costing, which has been gaining an increasing recognition in the world. The use of the possibilities inherent to this method will provide managers with the access to reliable, detailed and necessary cost information. Data obtained on the basis of the ABC model can be used, inter alia, in assessing the degree of consumption of individual resources, their distribution between different organizational units, the analysis of the variations occurring between plan and execution, as well as to a more effective implementation of the activities by identifying those that create the greatest value to the organization (Cinquini, Miolo Vitali, Pitzalis, Campanale, 2009).
We hope that the fact the one ambulatory care clinic in Poland has involved itself in the implementation of the method will be of a great advantage to the whole Polish health care system. The Polish health care system has a lot of problems, which in our opinion are partially a consequence of the lack of accurate cost information and management.

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