Full Length Research Paper

Cost analyses of some biochemical parameters: Activity based costing (ABC) method

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ABSTRACT

In the care of patients, medical analyzes are essential evidences to confirm a diagnosis. In Senegal, in 2005 and according to the National Health Accounts, Medical Biologys pending were estimated at 4.5 billion franc CFA. .Unlike drugs, very few studies have been conducted to assess the cost of medical biology acts in the care of patients. It is for this reason that we decided to determine the cost of these acts performed in the laboratory of Biochemistry, Aristide Le Dantec Hospital (National Referral hospital).This study was conducted over a period of three (3) months. This is a retrospective cross-sectional study in analytical target on the calculation of the cost of Biochemistry examinations. All parameters analyzed during this period have been included but have excluded all the parameters that were not measured due to breakage of reagents.The method used is the ABC method based on the identification of all activities for the determination of product costs.This study has shown that wages represent a very significant proportion of the total costs(60%). We have found that the cost is much lower if the analyzes are done with a plc.Our study has shown that using a plc is having an impact on reducing costs. This confirms that the interest for the state is to provide efficient equipment in order to reduce the cost of services.

Key words: Analyzes, Cost and Biochemical Parameters

INTRODUCTION

In most developing countries, health care is provided in public hospitals, private clinics but also at the level of health centers. These various institutions offer services of different level and of different quality.

The first contact with the patient and the health care system must be done in a dispensary, a clinic or a health center. And when treatment exceeds the capacity of the establishment of lower level, the patient is referred to an establishment of higher level. But this itinerary thus described is not always respected, because in the hospitals (level III) where services are more efficient and fees very low, clients tend to flow directly to these establishments and use the more specialized services even if they suffer from problems relatively mild. We are witnessing more and more to an over utilization of the establishments of level 3 as the first contact point with the health system and therefore an underutilization of establishments of level II (health centers) and Level I (dispensaries and health posts). To reduce the magnitude of this phenomenon, it is important to adopt a system of pricing. The pricing of health care is a factor of equity because in restructuring the rates in order to impose recovery rates higher in the establishments of level 3, it promotes the recovery of the total cost of health (Ndong , 1999).
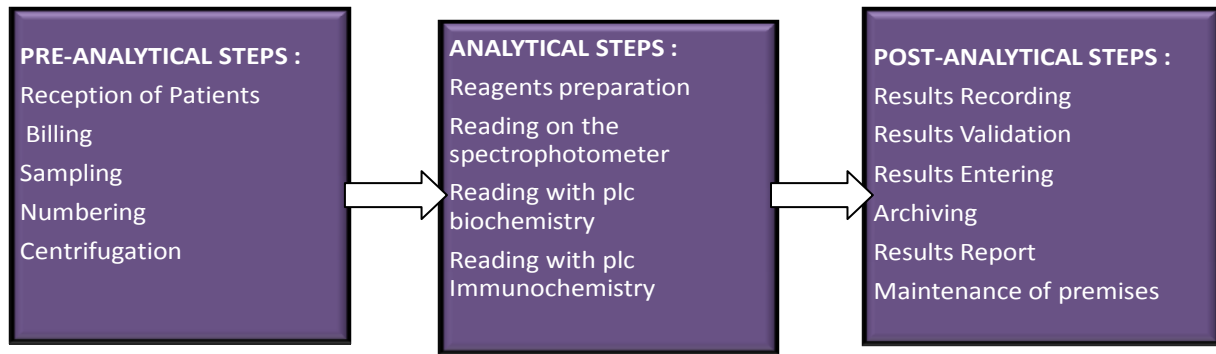
PRE-ANALYTICAL STEPS :	ANALYTICAL STEPS :	POST-ANALYTICAL STEPS :
Reception of Patients	Reagents preparation	Results Recording
Billing	Reading on the spectrophotometer	Results Validation
Sampling	Reading with plc biochemistry	Results Entering
Numbering	Reading with plc Immunochemistry	Archiving
Centrifugation		Results Report
		Maintenance of premises

Figure I. Laboratoryactivities

Table I. Costs of Activities

N°	Activities	Cost (FCFA)	Cost (%)
1	Reception	339217	2%
2	Billing	347842	2%
3	Sampling	1520600	8%
4	Numbering	910302	5%
5	Centrifugation	1003686	5%
6	Reagents Preparation	2537390	13%
7	Reading on spectrophotometer	2647114	14%
8	Reading with plc Biochemistry	2093407	11%
9	Reading with plc Immunochemistry	4572499	24%
10	Recording	936403	5%
11	Validation	867392	4%
12	Results Entering	481394	2%
13	Archiving	520221	2,9%
14	Results Report	40705	0,1%
15	Maintenance of premises	529987	3%
	TOTAL	**19348159**	**100%**

The purpose of this work is to calculate the costs of provided services in a laboratory by adopting the ABC method and the chosen structure as example is the biochemistry laboratory of Aristide Le Dantec hospital Aristide. This method allows the calculation of the total cost of provided services after a correct identification of all activities which fall within the process.

MATERIAL AND METHODS

This study took place in the biochemistry laboratory of the Aristide Le Dantec hospital in Dakar (Senegal). The study we carried out is a retrospective study which focused on the data collected on July, August and September 2012 when the laboratory operates optimally. The approach that we have adopted for the collection of data was to:
 - interview the staff,
 - exploit the documents such as the registers, invoices,
- study all the activities,
- measure the time it has taken to conduct the activities.
These information have allowed us to calculate the total cost by the following steps (Feby , 2010)
First step: Identification of the activities of the laboratory
Second step: Identification of the expenses

To identify the expenses we have interviewed the entire staff and observed all the equipment and materials involved directly or indirectly in the process
Third step: Calculation of the cost of the activities
To achieve this step, we have divided the expenses between different activities. The distribution is made using inducer of level I or inducers of resources. The inducers of resources are inducers of attendance and intensity of the demand for resources arising from the activities (Gouansangni , 2005).
Fourth step: calculation of the cost of provided services
The cost of activities is divided between the various provided services using inducers of level 2 or inducers of activity that are inducers of attendance and the intensity of activity request resulting from the provided services (Gouansangni , 2005).

RESULTS

The activities

The activities of the laboratory are grouped into different steps: pre - analytical, analytical and post - analytical (figure 1)
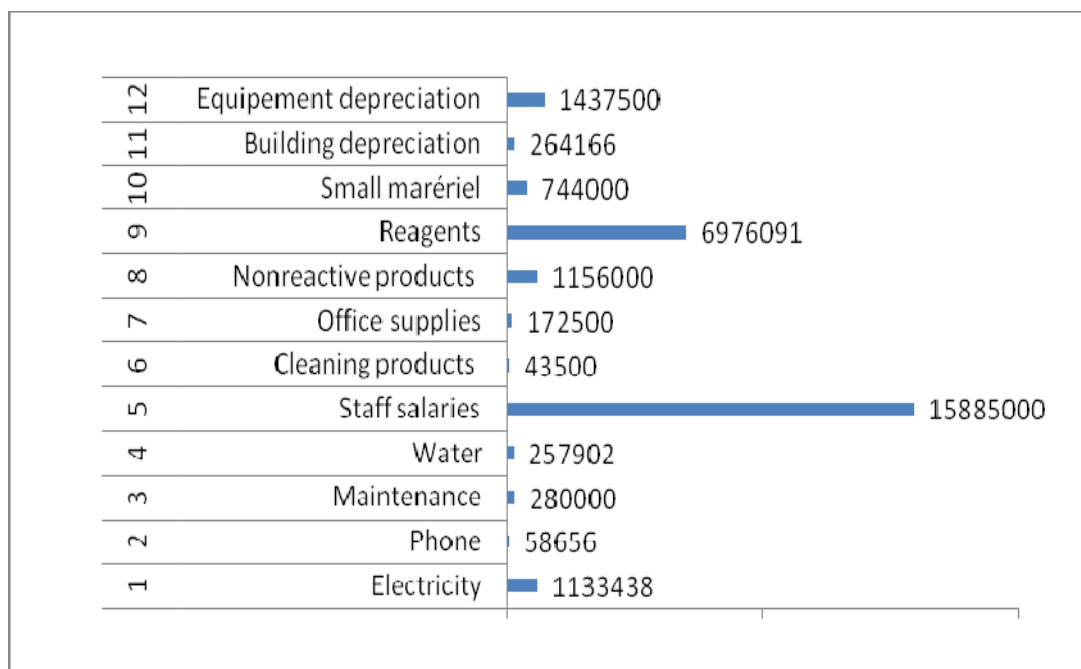
Figure 2. Expenses

Some activities requires much more resources compared to others and they are mainly the activities of dosage which consume the majority of the resources (table 1).

The expenses

They are made up of the whole of the human and material resources which fall in the performance of the activities. Figure 2 summarizes the total of these resources. In this figure we have noted that the wages represent 60% of the total expenses.

Cost of provided services

It is calculated from the cost of activities. For the most part of parameters the cost is very close to the rate applied (table 2), except for two (proteinuria, phosphate levels). For these two the cost is very high compared to the fee. These two parameters are dosed manually during this period.

DISCUSSION

The study shows that the staff expenses represent more than half of the total cost of provided services. This is stackable with some data: Example in the Ile de France in public institutions and in private health institutions, personnel expenses represent 62% of the costs (Proget régional de santé 2012). During the period of our study, they represented 60% of the total expenses, followed by the reagents (24.5 %), depreciation of the small

equipment (5 %), the non-reactive products (4 %), then come the other expenses the percentages of which are between 0.1 and 3.9 %.

In fact 55% of wages, plus water, electricity and phone bills are paid by the state and not by the structure.

All these expenses put together represent more than half of the resources. This is tantamount to saying that the State supports the highest part of the expenses for the functioning of our public structures. According to the forecasts of funding of the PNDS 2009-2018 and under the heading of expenditure, the state supports 64% of the health care expenditures. Then come the populations (19 %), the external partners (12 %), and finally the local authorities (5 %) (Plan national de développement sanitaire (PNDS) 2009-2018,).

This confirms that the state is the main provider of financial resources for health structures. Without the contribution of the state the rates would be unbearable by the populations.

Now that we are talking about free health care in our structures the state must prepare to withstand the substantial surplus of expenses. The study also showed that some parameters are more frequently requested (table 2). This is the case of the glucose, creatinine and urea which are parameters routine and emergency requests. It is also observed that for most of the provided services the cost is lower if the analysis is performed with a plc, that if it is done manually. The example is the determination of the phosphorus and proteinuriain 24 hours We have calculated the cost of these 2 parameters using as measurement device the spectrophotometer of biochemistry. This manual dosage of the phosphorus has

Table2. Frequency of analyzes, cost and applied fees

N°	Parameters	Frequency	Cost (FCFA)	Applied fees FCFA)
1	blood Glucose	1945	1724	2000
2	blood urea nitrogen	1379	1909	2000
3	Serum Protein	337	1724	2000
4	Serum Albumin	118	4298	2000
5	Transaminases	1173	1747	6000
6	Alkaline Phosphatases	218	1789	3000
7	Gamma-glutamyl transferase	121	1717	4000
8	Serum Calcium	738	1718	2000
9	Serum Magnesium	545	1795	2000
10	Serum Phosphore	452	7221	2000
11	Serum Bilirubin	238	4789	4000
12	Proteinuaria 24H	430	5227	2000
13	Serum iron	83	3037	2000
14	Total Cholesterol	463	1788	3000
15	HDL Cholesterol	260	1884	2000
16	LDL Cholesterol	378	2241	3000
17	Triglycerides	271	1736	3000
18	Serum Creatinine	1521	1682	2000
19	Uric acid	188	1752	2000
20	PSA	206	14041	15000
21	Ca bolt15-3	35	13522	15000
22	T3	96	11016	15000
23	T4	126	28371	15000
24	TSH	219	20838	15000
25	FSH	37	10212	15000
26	LH	30	9012	15000
27	Prolactin	27	28191	15000
28	AFP	47	13616	15000
29	Ca 125	114	14696	15000
30	Ferritin	34	12400	15000

created a cost equal to 7,221 FCFA. If the calculation was done by using a measurement device much more modern such as plcs, this cost would decrease. The expenses such that the preparation of the reagents would not be taken into account.

For some parameters the cost exceeds largely the rates applied (table 2). What justified that an economic evaluation must be frequently performed in the field of health. At the laboratory level the tariffs had been applied since the hospital reform and despite the variation of prices in the market it has never had a modification. This adjustment of tariff would contribute to the financing of the service and thus to the perpetuation of different services.

CONCLUSION

In Africa the incomes mobilized from the fees charged for medical care are not as significant when compared to the number of patients who attend the health care units. This is at the origin of a low cost collection observed in most public hospitals that receive the greater part of the state financing (10). The main reason is the absence of a pricing, because when the populations can treat themselves free or with low fares, they no longer have any interest to attend private or lower level structures. It is this phenomenon which explains that the public institutions of level 3 become the center of attraction for the entire population.

To overcome this obstacle it is important to apply tariffs to all the medical services. This pricing must go through an assessment of the cost of provided services. This would promote a proper functioning of the health sector, by allowing a part of subsidizing the services and on the other hand, having a private sector robust and independent of the public sector.

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