AMERICAN UNIVERSITY OF BEIRUT

COSTING AND PRICING OF SERVICES AT LABIB MEDICAL CENTER – CONSULTING PROJECT

by
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A project
submitted in partial fulfillment of the requirements
for the degree of Master of Business Administration
to the Suliman S. Olayan School of Business
at the American University of Beirut

Beirut, Lebanon
May 2015

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Date of project presentation: April 14th, 2015.

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ACKNOWLEDGMENTS

I would like to thank Dr. Victor Araman, my adviser and my teacher, for his support, patience, and continuous motivation

I would also like to thank Dr. Samer Khalil for his support and positive feedback

I would like to thank my family and friends for their encouragement and support

Finally, my husband Samer and my lovely daughter Nour - I couldn’t have done it without you!

AN ABSTRACT OF THE PROJECT OF

Samar Khodor Al Rifai for Master of Business Administration
Major: Business Administration

Title: Pricing and Costing of services at Labib Medical Center .

This consulting project about costing and pricing of services at Labib Medical Center (LMC) aims at helping the management of LMC in exploring the challenges and opportunities that enable it to manage the cost and pricing of the services offered and maximize revenues.

Looking at the services where pricing is tough to negotiate, improving costs is crucial, where building cost models is a starting point. Units at LMC are divided into profit and cost centers. Cost per one unit of measurement per profit center is calculated, where total cost is equal to the sum of direct, overhead, and share of indirect and service departments' costs.

On the other hand, looking at one of the services, where LMC could improve its profitability by improving its pricing strategy, this project presents to the management different pricing approaches of the rental fees of the clinics. Increasing flat rate versus price modeling driven by willingness to pay increased total revenues generated from 34% to 228%.

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To Samer & Nour

EXECUTIVE SUMMARY

Labib Medical Center (LMC) is a medium-sized hospital located in Saida, South Lebanon. As most revenues at LMC are generated from governmental institutions, most tariffs cannot be negotiated. As a result, LMC's management finds itself facing a big challenge of controlling the costs of the services offered. One of the solutions that will help LMC face these challenges is to apply cost management for the services it offers. The main objective of the first part of the project is to group the total costs of delivering the medical services into cost models for managerial and control purposes. The units at LMC are divided into profit centers and cost centers (or service departments). The total net costs allocated to each profit center is equal to the sum of each center's direct costs, overhead costs, share of indirect cost, and share of total costs of the service departments. The total cost per profit center is allocated according to each center's unit of measurement, for example, cost per operation, etc… After building the cost models, the management is highly recommended to use them in order to develop budgets and monitor the efficiency of its resources. Besides offering medical and surgical services to the patients, LMC has a clinic center rented to doctors. Currently, LMC charges flat rates for the rental fees while incurring fixed costs, which results in an operating loss. The second part of this project aims at exploring the different opportunities that LMC management could have in pricing these clinics. Two different approached are presented: 1. Today the clinics are underpriced and therefore one approach is just to increase the current (monthly) rate on all Drs by an average of 33% that can increase revenues by (34%) without affecting demand. However,2. a more sophisticated approach is also presented that divides the day in two half days and allocate to every Dr

a number of half days, given his/her current patients load and their willingness to pay and the fact that some (half) days are busier than others. The result is an incredible increase of around 228% in total revenues generated from the clinics without affecting the service guaranteed to the DRs (turning really the clinics from factually being a cost center into a profit center).

CHAPTER I

INTRODUCTION

A. Introduction

On May 6th 2014, Mr. Abou Zahr, Labib Medical Center's General Director, sighed in exasperation as he rubbed his forehead anxiously. He was sitting in his office that afternoon looking at the minutes of one of the meetings he attended at the Syndicate of Hospitals in Lebanon few days ago. He was recalling the details of the meeting, which gathered many hospitals from different Lebanese regions discussing one issue, the increasing cost of healthcare services.

Labib Medical Center is a medium sized hospital located in Saida, South of Lebanon, founded in 1973. It provides several medical services to its community and has put large investments in capital expenditure in order to have a more sustainable financial prospect, by widening the range of its services to keep up with competition and generating higher profits.

A large percentage of revenues at LMC are generated by governmental institutions, which tariffs do not necessarily take into consideration the increasing costs of healthcare, in particular when it comes to wages and direct supplies. This issue has been a major challenge for most medium-sized hospitals and has been the primary topic of discussion in most of the meetings of the Syndicate.

LMC's like any profitable organization is driven by revenues and costs. For most of the services provided by the hospital patients tariffs are mainly set by the government, and demand is not the issue. Therefore, improving profitability is directly linked for those services to the tariffs but more importantly to the cost structure. As a

matter of fact, when the negotiations are usually taking place with the government with respect to those services tariffs, the main driver of the discussion is the cost itself. On the other hand, when it comes to the clinics, the service offered to Drs to receive their patients, they incur usually a fixed cost and LMC has a direct control on its pricing scheme.

Driven by LMC quality mission of offering the best medical services to its patients in a cost effective manner, Mr. Abou Zahr decided to call for a meeting with the financial manager (FM) at LMC who is also an MBA student and ask her to work on this project.

The objective of the FM in this study is of two folds. First and foremost is to understand and structure the costs incurred by LMC and breaking them down to the operating unit. Such critical exercise will allow a great transparency in the cost structure down again to the unit level as opposed to the cost opacity that exists today. The advantages are numerous including

- Possibility to evaluate and assess the effectiveness of the current strategy adopted by LMC but also the efficiency and productivity of current processes and resources available at an aggregate level but also in each unit.
- Be able to take advantage of best practices, benchmarking and be able to link these to a set of action plans to improve the current way of doing
- Be able to leverage on any IT platform available or could be implemented that would help reporting, but also managing costs and eventually profitability.

Secondly, this report tackles the pricing part of the clinics. Tactically, the clinics with their fixed costs and capacity constraints are amenable to revenue management techniques. Even though not typically done, we believe it is a serious opportunity for

LMC to consider. Revenue management, also known as yield management in the airline industry, is an approach often used by capacity-constrained industries to maximize profitability by allocating the right product to the right customers at the right price (Ltd., 2015).

In conclusion, the FM tries to approach the two modeling parts mentioned above by trying to answer the following questions. What is the main approach followed in designing the cost models? What are the main cost categories that will be included? What are the key measurements that these models will be looking at? What are the main limitations but also recommendations that will be eventually passed to management? Finally, what are the different approaches followed to price the clinics' rental? How the models will be designed to answer such query?

The first part of the project summarizes the different steps followed in planning, developing, and building cost models and give recommendations as to how to benefit most from these models. The second part of the project presents and evaluates pricing tactics for the clinics rental problem and studies their impact on revenues.

B. Health Care Industry in Lebanon

Lebanon is one of the most dynamic healthcare markets in the Arab region. It has one of the best quality healthcare sectors in the Middle-East; it also enjoys a growing health tourism and cosmetic surgery sector.

However, despite its superior services to neighboring countries, the Health care sector in Lebanon is recently struggling due to the socio-economical and political factors from the neighboring conflict in Syria and the increasing cost of Healthcare.

Lebanon spends above 6% of its GDP on Healthcare services. This figure has dropped from above 10% in the recent years due to the poor performance of the economy, high net public debt, and increasing wages thus pressuring the government budget (Banque Bemo, 2013). The high public debt limits public expenditure on healthcare. The burden of the health expenditure has been shifting from the government to the private households, however, unless the economic performance improves, the current pattern of health care expenditure will weigh on the Hospital industry adversely affecting the quality of services provided. There is a total of 163 Hospitals contracting with the Ministry of Public Health, 84.66% of the Hospitals are private Hospitals while 15% are public hospitals of which 12% are located in South Lebanon **(see A. 1)** (Banque Bemo, 2013).

Saida hosts a number of medium to large sized hospitals where Hammoud Hospital University Medical Center (325 beds), largest hospital in Saida, and Labib Medical Center are the most popular ones in the region (Hammoudhospital.com, 2014). These hospitals admit patients who are covered by public institutions, for example, Ministry of Health. In fact, every patient admitted to any hospital is either a self-payer or is guaranteed by a third party which could be a governmental institution, non-governmental institution, or an insurance company. The tariffs set for the services offered and covered by the governmental guarantors are imposed by these institutions. Although the region is facing difficult economic and social conditions, these institutions are resistant to adjust these tariffs accordingly to match the increasing costs, especially in salaries and wages. As a result, healthcare systems seek to optimize the quality of the services offered to the patients while maintaining cost levels in an objective of improving their bottom lines. They tend to exercise cost containment in order to

maintain their financial stability and achieve their quality missions. Directors and managers face a big challenge in monitoring and increasing the efficiency of these systems by analyzing and controlling the cost of these services. In other words, these systems tend to enhance efficiency by applying cost management.

By definition, cost management is all about collecting, analyzing, and evaluating cost information for budgeting and monitoring purposes. Cost management help achieving effective financial control that has enormous impact on a hospital's bottom line. CFOs should create processes that enable the collection and analysis of data aimed at building a cost model that is used for decision making and control purposes. A cost model categorizes the different types of costs, helps identifying their distribution and weight according to each service, and provides a base for the management to rely on in taking decisions regarding resources' efficiencies, pricing schemes, third party contracting, and benchmarking. In summary, it is crucial when one cannot control its pricing strategy, he or she should know his or her costs in order to balance quality of services offered with level of the bottom line.

C. Overview of Labib Medical Center

Labib Medical Center (LMC) is a family owned business established in the city of Saida, south Lebanon, in 1973 by the late Dr. Labib Abouzahr. The main activities of the center are to provide hospitalization and other medical and health care related services to patients.

Initially, the center had three floors with 59 beds and hosted both medical and surgical cases with a kidney dialysis center, intensive care unit, and diagnostic center.

After several phases of development and renovation, the medical center expanded its capacity to 102 beds including high standard suites and single rooms and currently has more than 320 employees alongside with a number of full-time (around 45 doctors) and part-time doctors.

Major Services offered are medical services (internal medicine, c), surgical services (open heart, orthopedic, etc…), endoscopy (bronchoscopy, colonoscopy, etc…), kidney dialysis center, diagnostic services (laboratory, radiology, cath lab, etc…), and patients' clinics.

In the year 2005, LMC was awarded the Lebanese Accreditation Certificate and was categorized under "Class A" according to the accreditation standards. Later in 2006, it has obtained the ISO 9001:2000 Certificate from the TUV Company that was valid for three years. Annual follow-up audits were performed during that period to maintain and improve the quality system and the hospital performance. In June 2010, the TUV performed the recertification audit at LMC and awarded the ISO 9001:2008 Certificate which was also valid for three years. In September 2011, an audit was conducted by Gates to recertify the center with the Lebanese Accreditation. And finally in 2012, the center was awarded HACCP certification for the food safety management. The hospital executive management team is a group of skilled and experienced personnel who are committed to continuous quality improvement. The team has always striven to provide high quality health care services and maintain customer loyalty.

LMC quality mission is having the objective of emphasizing a customer-centered approach addressing the needs of its customers, enhancing their satisfaction, by improving and continuously monitoring its employees' capabilities, enrolling experienced professionals, and providing them with continuous education, thus

providing its customers comprehensive, accessible, competent health care services in a cost effective way, to further enhance customer satisfaction and improve the quality of the services rendered.

At LMC, around 70% of the revenues are generated from patients guaranteed by a governmental institution, while others come from insurance companies or from self-payers patients. Examples of governmental institutions are the National Social Security Fund (N.S.S.F.), the Ministry of Health (MOH), the Government Employee Cooperative (GEC), the Ministry of Defense (army), etc…

As said before, the tariffs set for the services offered and covered by the governmental guarantors are imposed by these institutions. As for the insurance companies, the tariffs are can be negotiated. The tariffs vary according to the service offered and the class of the admission (suite, first class, second class, third class).

CHAPTER II

PART 1: BUILDING COST MODELS OF THE PROJECT

A. Objectives of the Project: An illustrative example

When a patient is admitted to LMC (or is an out-patient), he or she receives a bundle of medical care services which are summarized in the medical bill charged to the patient. These services include room and board (for example normal stay, intensive care unit including hotelier services), daily disposables (routine medical supplies), laboratory charges, radiology charges, medical supplies, medication, operating room charges, other hospital charges, and doctors' fees.

Example (medical admission):

Mrs. Y is admitted to the hospital for having a fever and is expected to stay for two days in the second class covered by NSSF. The admitting doctor orders the following:

- CBC test (Hematocrit, RBC, WBC, etc...)
- Chest X-Ray
- Antipyretic (to reduce fever)
- Antibiotic (after examining lab results)
- One bag of Mixed 0.45% 1000 ML (I.V.)

The bill can be summarized as below where the unit prices used follow the tariffs imposed by NSSF:

Service Description	Unit Price	Total Amount	NSSF share	Patient Share
Normal Stay (bed)	87,000 / day as lump sum	174,000	156,600	17,400
Professional Fees (doctor's fees)	40,000 / day	80,000	72,000	8,000
Infusions	3,376/bag	3,376	3,038	338
Laboratory	245 / L	11,025	9,923	1,102
Radiology	405 / R	24,300	21,870	2,430
Medication	According to each drug and each dose following the Ministry of Health tariffs	40,631	36,568	4,063
Total Charges (in LBP)		333,332	299,999	33,333

Fig.1. Sample of Medical Bill

The main purpose of this project is to take the main components of the medical bill representative of the services that might take place in different departments (called hereafter profit centers), evaluate them from cost point of view, and then group the results into cost models.

For all the reasons I have mentioned before, these models should enable the finance department (FD) to present to the management the cost drivers of the services the hospital offers and show alerts to areas which need further attention to capture information for cost analysis and management. In simple words, these models should at the end add up the total costs incurred from the treatment of a patient as opposed to the revenues earned as presented in the bill.

The main approach followed in this project is breaking down the costs bulkily presented in the profit and loss statement of LMC into service levels across the different profit centers. After collecting the different data essential in this study, costs at the different profit centers are identified and categorized between direct, overhead, and indirect costs. Direct costs mainly include labor costs, supplies costs, and dietary costs

that are directly related to the operations. Overhead costs include cost of utilities, stationary, laundry, depreciation, etc… Under indirect costs fall two parts. The first part represents mainly the share of financial costs (and others). The second part represents the share of allocated service departments' costs. The costs that are incurred in these service departments or also called cost centers are allocated to the profit centers using step-down approach. As a result all costs are broken down and grouped in the models according to each profit center.

B. Summary of the approach followed

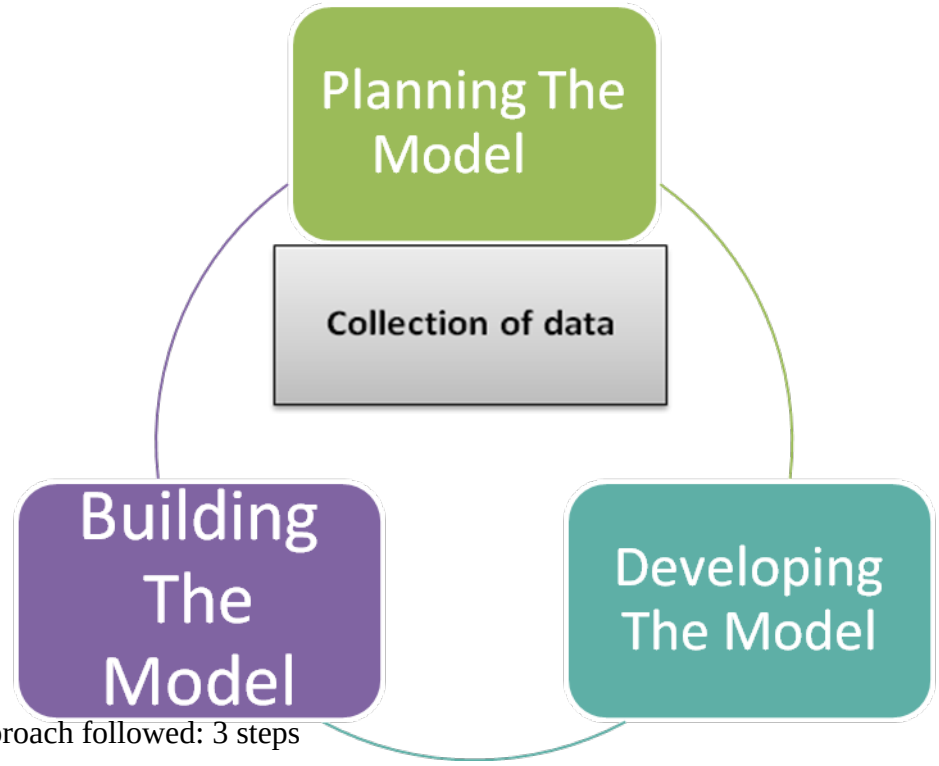


Fig.2. Approach followed: 3 steps

C. Collecting the data

The main sources of data used in this project are secondary data.

Table 1: Sources of Data

Data	Source
Cost categories	P&L
Patient days	Logs
Occupancy rate	Logs
Operations	Logs
KD sessions	Logs
Endoscopy procedures	Logs
Cath Lab	Logs
Lab/Rad	Billing system
Store sales to departments	Stock system reports/logs
Salaries	HR system/ accounting system
Meal Census	Logs
Cost details	accounting system
Contractual Maintenance	Contracts/biomedical logs and reports
Cleaning consumption	contractor logs
Depreciation	Fixed assets register/accounting system

Logs are filled by head of departments on daily or monthly basis and are used to prepare periodical reports. The data used mainly cover periods back to 2014 (some are back to 2013) (see A. 2).

D. Planning the models

As said before, the items that are charged in the medical bill are representative of the services that are offered through different profit centers. So the models will be built around the different profit centers that exist in LMC.

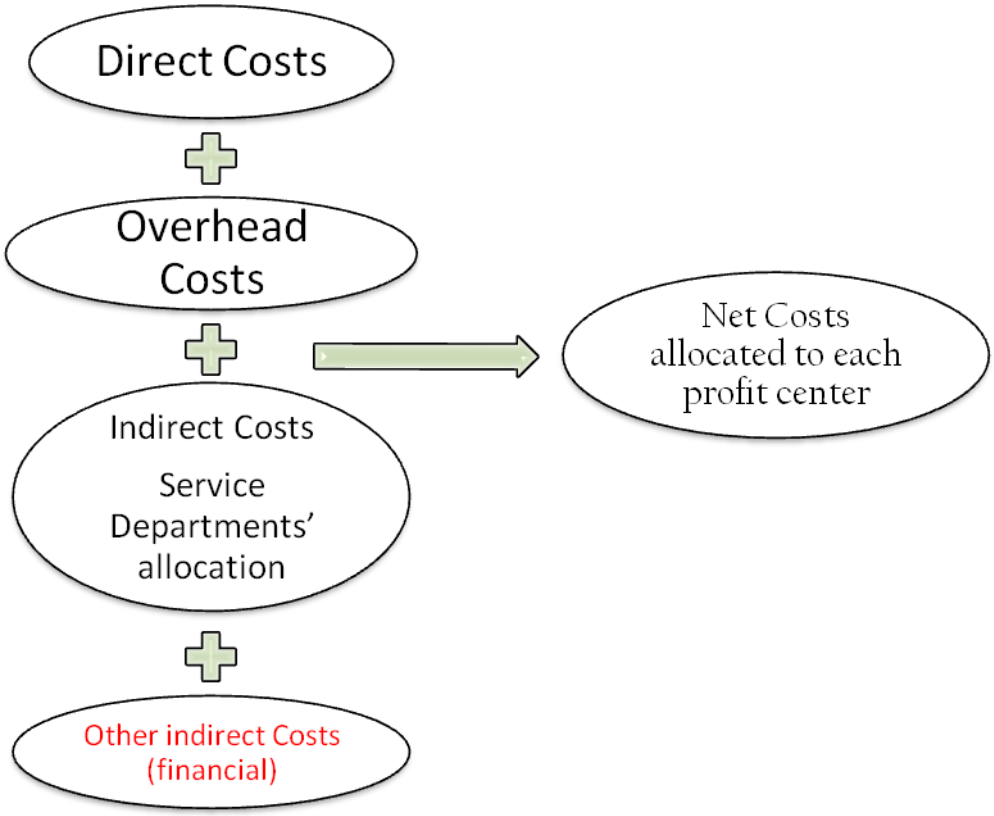


Fig. 3 Summary of Total net Costs allocated to each Profit Center

1. Profit Centers

By definition, profit center is a part of a business that directly contributes to its profit (Wikipedia, 2015). Profit center is a revenue generating center that encompasses cost becoming as a result a blend of both cost and revenue centers.

At LMC, the profit centers are directly related to the patient. There are several groups of centers categorized according to the service provided to the patient.

<u>Group 1: Ward</u>

This group includes floors or wards where the patient stays when he or she is admitted without need for intensive care. The floors at LMC are distributed as the following:

- Medical Floor – MF: the first floor at LMC hosts medical patients or post-ICU patients.

- Second or surgical Floor – SF: the second floor hosts patients after surgical operations (it also hosts medical patients).
- Cardiac Ward – CW: the fourth floor hosts cardiac patients.
- Fifth Floor- FF: the fifth floor hosts patients with upgraded class.
- OBS/GYN: ward that hosts (female) patients after delivery mainly.
- Chemotherapy-CH: ward that host patients who receive treatment for cancer.
- Pediatrics: ward that is special for pediatric patients.
- Nursery: ward that hosts newborn and babies.

Group 2: I.C.U.

This group includes units that provide intensive care for patients who are in need. The units are distributed as the following:

- Heart Intensive Care unit – HICU: this unit hosts cardiac patients (adults) who are in need of special care (CCU). This unit also hosts patients who undergo open heart surgery (CSU).
- Neonatal Intensive Care unit – NICU: this unit hosts babies who are in need of special care.
- Intensive Care unit – ICU: this unit hosts adult patients who are in need of special care.

Group 3: Diagnostic Centers

This group includes units that undergo diagnostic procedures, including the following:

- Laboratory
- Radiology
- Endoscopy

- Catheterization Lab (cardiac diagnostic procedures)

Group 4: O.R.

This group includes units that undergo surgical operations, mainly:

- Open Heart: unit for open heart surgeries
- Operating Room – OR: unit for all surgeries except open heart

In addition to these two units, I have added to this group the normal delivery unit.

Group 5: other

This group includes the kidney dialysis center (KD) and the emergency department (ED).

2. Cost Centers

By definition, a cost centre is part of an organization that does not generate direct profit and adds to its total costs (Wikipedia, 2015). At LMC, the cost centers include mainly the service departments that are not directly related to the patients and are as the following:

- Administration and accounting
- IT
- Procurement
- Maintenance
- Infection control and environmental health
- Medical records
- Laundry
- Pharmacy (also can be considered as profit centers since it generate revenue from the sale of medication, but in this project I will not talk

about the profit generated from medication rather I will talk about the other costs and distribute them).

3. Key Measurements

The cost models will measure cost of services offered across the different profit centers as the following:

- Cost per one patient day (ward-ICU): one patient day represents the stay of a patient during one day in any floor/unit.
- Cost per one operation (open heart and others).
- Cost per one kidney dialysis session.
- Cost per L: every lab test has a weight measured by L.
- Cost per R: every radiology procedure has a weight measured by R.
- Cost per one procedure (endoscopy/ cath lab/ER).

4. Cost Categories

In this section, I will present the different cost categories that are part of the P&L. Details of calculating these costs will be presented in the next section. This classification is applicable for all profit centers.

- <u>Direct Cost</u>

The first category in the model includes the direct costs incurred by each center. The direct costs consist mainly of the following:

- Labor cost:

The labor cost is the cost of manpower used in delivering the service in any specific unit. The labor cost is calculated based mainly on the ratio of human resources per one key indicator (example: ratio of nurses per patients in CW, ratio of nurses per one operation).

- Medical Supplies and Medication:

This cost includes the medical supplies and medication that are used in delivering the service and that are included in the price of this service, i.e. not billed and paid by the patient separately.

- Dietary cost:

In ward, ICU, and KD, patients receive meals included in the cost of stay and not paid separately. Cost per one meal is calculated.

- Overhead Cost

The overhead costs in the profit centers include those costs that are not included in direct labor and direct medical supplies. They are calculated on average per one indicator and include the following:

- Cleaning cost or cost of housekeeping: the housekeeping service is outsourced. The average monthly cost is allocated among the centers according to the distribution of cleaning staff among the floors.
- Stationary cost: average consumption is calculated and divided among the centers.
- Waste management cost: the medical waste that is generated from each patient stay or operation or any other procedure is collected and treated by an outsourced contractor. The cost is per one kilo of waste. So cost is allocated based on average of waste generated by ward and so on.
- Laundry cost: this cost includes cost of linen used on average by each patient.
- Maintenance cost: this cost includes ordinary and contractual cost in each unit. Also the cost includes biomedical maintenance.

- Electricity, diesel, & fuel: this cost includes average consumption of these utilities by each unit.
- Depreciation Cost
    - The depreciation cost is included in the model although it is a non-cash expense but it is part of the P&L.
    - Depreciation cost represents the allocation of the cost of assets over years. In order to match the total cost listed in the P&L, the same allocation method will be used in this model.

- Indirect Cost allocation

This category includes costs that are not directly related to the services offered to the patients and mainly includes the financial expenses. For simplicity, these costs are directly allocated to profit centers since they are the results of operations that take place at these centers. The following steps are followed in the calculation of the allocated share of these costs for each profit center:

- Average monthly costs of each profit center are calculated.
- % of total cost for each center is deduced.
- Average monthly total indirect costs are calculated.
- Share for each center is computed using pro-rata basis based on the percentages calculated in the second step.
- Indirect costs' share per each unit of measure is determined by dividing the total share computed in the previous step by the unit of measure for each center taken from the statistics used in this report.

- Service Departments/ Cost Centers Cost allocation

Service departments are those cost centers that do not generate revenues. They are the support systems that are essential in providing the service to the patients. The allocation of the service departments' costs to direct patients' departments or profit centers is being implemented more by hospitals in order to reflect the total actual cost of the service provided to each patient. One of these reasons why these costs should be allocated is because they constitute an input in the delivery of service. There are different allocation methods that can be used:

- Direct method: allocates costs directly to the profit centers without taking into consideration the other service departments.
- Step-down method: allocates costs to other service departments in one-way then to profit centers. Its result is affected by the order of the departments and is most commonly used for its simplicity.
- Reciprocal method: recognizes reciprocal services between departments. But it is the most complicated method yet the most accurate one.

Using the step down method (for its simplicity) to allocate total cost of the service departments to the profit centers, both cost and profit centers were first arranged by order of serving the most to serving the least units. Then total costs per department including direct, indirect, and other costs to other departments is allocated using appropriate allocation base.

E. Developing the models

1. Labor Cost

- Wards & I.C.U.

The labor cost at the wards and in the intensive care units is mainly the sum of the cost of nurses' salaries per one patient day. Nurses are divided among three main categories in each unit:

- Registered Nurse-RN: nurses holding BS degree
- Practical Nurse –PN: nurses holding BT degree and who get lower wages than RNs
- Nurse Manager-NM: head nurse of the unit

In addition to these categories, there is nursing administration staff including one nursing director (ND), one nursing educator, and three supervisors.

For each category, the following is taken into consideration in order to measure the cost:

- Ratio of nurses to patient
- Average total benefits is calculated including basic salary, benefits, NSSF subscription, training, and end of service provision (average 4% for Lebanese, one month-salary for non-Lebanese)
- Number of beds and occupancy rate

Table 2: Labor cost of NM/RN per one patient day in Pediatrics

NM	
Number of beds	8
Average days (whether working or not)/month	30
Average labor COST per month	LBP 1,577,664.44
Average transportation/day/nurse	LBP 8,000.00

Average labor cost per day	LBP 60,588.81
occupancy rate PEDI	61%
Average labor cost/day/NM	LBP 12,506.87

RN	
Number of beds	8
Average days (whether working or not)/month/nurse	30
Average # of RNs per day shift	2
Average # of RNs per night shift	2
Average # of patients per day shift per nurse	4
Average # of patients per night shift per nurse	4
Average occupancy rate per day	61%
Average COST/month/RN/**day or night** shift	LBP 1,364,126.55
Average COST/day/RN/**day or night** shift	LBP 45,470.88
Average transportation/RN/**day or night**	LBP 8,000.00
Total average labor cost/day or night/RN	LBP 53,470.88
Average labor cost/RN/one patient day	LBP 44,150.27

Average labor cost per one patient day is calculated by dividing average cost per one day by (Number of bed * occupancy rate = average occupied bed). The cost of nursing administration staff is allocated mainly according to the nursing staff ratio and number of beds in each unit.

- Diagnostic Centers-Operating Room-Other

In this group, average labor cost per one indicator is calculated using the total number of procedures done according to each category of patients.

Table 3: Labor cost/endoscopy

Technicians	
Average days (whether working or not) per month	30
Average cost per month	1,179,308
Average transportation/day	8,000
Average labor cost per day	47,310.28
Average # endoscopy per month	72
Total average # endoscopy per day	2.79
Average labor cost/endoscopy/day	16,979.45

- Labor cost for cost centers

This cost will be included in the service departments cost allocation. For each center, average monthly total salaries is estimated including all benefits from basic salaries, benefits, transportation, NSSF subscriptions, training, and EOS indemnity.

2. Medical Supplies & Medication

In this category, only those supplies and medication that are not directly billed and paid by the patient are taken into consideration, i.e., that are included in the lump sum tariff of one stay or procedure. In each unit, there are two types of medical supplies:

- Average cost of MS posted directly to the patient: average quantity used per one patient X price per item.
- Average cost of MS that are requested on periodical basis to the unit store is calculated and then average per one patient.

Table 4: Example of MS used per one patient day

Medical Supplies per one patient	Unit Price	average quantity used (day)	average cost
Underpad	0.0783	3	0.2349
Syringue (3 cc)	0.0395	1	0.0395
Syringue (5 cc)	0.041	3	0.123
Syringue (50 cc)	0.55	6	1.65
Syringue (20 cc)	0.12	4	0.24
Needle (18)	0.0165	3	0.0495
Tegaderm 6*7	0.25	1	0.25
IV			
Montage Regulator/simple	0.36	1	0.36
Cannula 24	0.48	1-2.	0.96
Cannula 22	0.55	1	0.55
Robinet (3-way) Channel	0.23	1	0.23
Disposable gown	0.65	1	0.65
Surgical face mask	0.09	1	0.09
Alcool swab	0.03625	6	0.2175
Thermometer probe	0.044	1	0.044
Total average direct MS			$5.688

Floor Store Request:

Medical Supplies	Unit Price	average quantity used (weekly)	average monthly cost
Gauze swab	1.55	2	12.4
Plaster anti-allergic 1- inch (per week)	0.6875	2	5.5
Plaster anti-allergic 2- inch (per week)	1.375	1.36	7.48
Plaster anti-allergic 3- inch (per week)	2.0625	0.083	0.68475
Skinmansoft	5.85	2	46.8
Biohazard waste bag	0.06	14	3.36
ASEPTO BULB SYRINGE WITH TIP PROTECTOR 80/BX	0.5	4.56	2.28
BATTERY AAA	0.4	1.33	0.53
DISPOSABLE COVERSHOE NON-SKIT BLUE	0.02	2.22	0.04
9401 FLEECE PROTECTIVE GOWN YELLOW/BLUE	0.65	12.78	8.31
KIDNEY SHAPED BASIN 500cc DISPOSABLE	0.3	3.22	0.97
PG585310/6 MANISOFT LITER (MANUCLEAR)	3.48	0.67	2.32
SYRINGE PERFUSOR 50ML W/O NEEDLE (8728844F)	0.55	83.22	45.77
Sharpack big 22 L	9	0.5	18

Gloves Latex (2 boxes/week)	0.032	200	25.6
Gloves Free powder (5-6 boxes/month)	0.065	150	39
Sharpack small 1.63 L	1.5	1	6
Incidin foam (1/ month)	15.6	0.250	15.6
Total cost of monthly floor request			240.64
Average patients' days			64.73
Total cost of monthly floor request allocated daily per one patient day			$3.72

In departments like anesthesia (included in the OR), cost of MS is calculated according to each type of anesthesia. Also in this category, cost of medical gazes is included.

3. Dietary Cost

Every patient admitted to the hospital, whether in ward, ICU, or KD, is entitled to a number of meals according to his or her admission class and length of stay. Meals are classified according to different types distributed as the following:

- Breakfast/lunch/dinner
- Sandwiches
- Fluids
- Snacks
- NGs (for ICU patients)
- First class special trays

The cost of one meal is divided among direct labor cost, direct cost of supplies and food, and other different cost.

- Direct labor cost per one meal

The tasks of dietary staff are distributed as the following:

Table 5: Distribution of Dietary Staff

Floor Runner	Collection of cards
Floor Runner	Check up of cards
Chef	Preparation
Assistant chef	Preparation
2 diet aids+1 chef+1 assistant chef	Plating
Floor Runner	Distribution
Floor Runner	Recollection

The daily working hours for dietary staff are distributed according to each task per each type of meal. Then average cost is calculated using average benefits that include, as for nurses basic salaries, transportation, benefits, NSSF subscriptions, and EOS provision.

Table 6: Average Labor cost per Type of Meal

Type of meal	Average labor cost
BREAKFAST	LBP 1,964.74
LUNCH	LBP 2,495.66
DINNER	LBP 3,354.25
FLUIDS	LBP 1,126.64
NG	LBP 3,748.05
SNACK	LBP 2,122.04
Sandwiches	LBP 2,425.38

FIRST CLASS	LBP 1,655.19

- Direct food cost per one meal

The direct food cost per one meal includes the cost of all food items in every tray. This cost was given by the head of dietary department who calculates it on quarterly basis for control basis.

The cost varies according to each type of meal and increases for first class patients.

Table 7: Average Direct Food Cost per Type of Meal

Type of meal	Average direct food cost
Dinner/lunch	LBP 1,599
Breakfast	LBP 1,338
Snack	LBP 600
Sandwich	LBP 1,200
Fluids	LBP 816

- Other different cost per one meal

The other different costs per one meal include the cost of utensils, general utilities, linen, stationary, supplies, calibration, depreciation cost, and other miscellaneous costs. Total average costs are calculated and divided by the average number of meals consumed to deduce the average cost per one meal.

Ward/ICU	Breakfast	Lunch	Dinner	NG	Fluids	Snacks	Sandwiches
Labor cost per one meal	LBP 1,964.74	LBP 2,495.66	LBP 3,354.25	LBP 3,748.05	LBP 1,126.64	LBP 2,122.04	LBP 2,425.38
Direct cost of food per one meal	LBP 1,338.30	LBP 1,599.00	LBP 1,599.00	LBP 2,881.00	LBP 816.09	LBP 600.00	LBP 1,200.00
Utensil/Misc cost per one meal	LBP 435.85	LBP 435.85	LBP 435.85	LBP 435.85	LBP 435.85	LBP 435.85	LBP 435.85
Different cost per one meal	LBP 198.95	LBP 198.95	LBP 198.95	LBP 198.95	LBP 198.95	LBP 198.95	LBP 198.95
Total cost per one meal 1	**LBP 3,937.84**	**LBP 4,729.47**	**LBP 5,588.05**	**LBP 7,263.85**	**LBP 2,577.53**	**LBP 3,356.84**	**LBP 4,260.18**

Stationary cost	98,657.08
Depreciation cost	719,453.67
Miscellaneous cost	2,584,525.00
Electricity, diesel, & fuel	4,383,510.89
Service departments cost allocation	7,560,602.42
Total	**15,346,749**
average monthly meals	6,134.89
cost per one meal	**LBP 2,501.55**

First class	Breakfast	Lunch	Dinner	Snacks	Extra
Total cost per one meal 1	LBP 3,938	LBP 4,729	LBP 5,588	LBP 3,357	
additional Labor cost per one meal					LBP 1,655.19
additional direct cost of food per one meal	LBP 2,263.30	LBP 2,267.30	LBP 2,267.30	LBP 2,858.00	LBP 7,682
additional utensils cost	LBP 71.00	LBP 71.00	LBP 71.00	LBP 71.00	LBP 71.00
Total cost per one meal 2	**LBP 6,272.14**	**LBP 7,067.77**	**LBP 7,926.35**	**LBP 6,285.84**	**LBP 9,408.19**

Fig. 4 Total Cost per One Type of Meal

Meals per day		3	
OBS	Breakfast	Lunch	Dinner
Direct cost per one meal	3,937.84	4,729.47	5,588.05
Other cost per one meal	2,501.14	2,501.14	2,501.14
Cost of meals per one patient day	LBP 21,758.78		

Fig. 5 Example: cost of dietary per one patient day in OBS department

4. Overhead Costs

- Cleaning Cost

LMC outsources a housekeeping contractor for a fixed monthly fee. This cost includes the cost of staff, cost of supplies used, and others.

The housekeeping staff is distributed throughout the hospital during day and night shift. The labor cost is allocated to the profit centers according to this distribution. Moreover, the cost of supplies used is distributed according to the consumption of each unit (average is taken from one-year data) (see A. 5).

- Stationary Cost

The stationary cost is calculated based on average monthly consumption per each unit using the sales report from the stock system that details the quantity and cost of stationary per each department (see A. 6).

- Waste Management Cost

On daily basis, housekeeping staff segregates medical waste from regular waste and collects them in special containers. LMC outsources the waste management contractor who on monthly basis collects these medical wastes and treats them according to environmental laws. The contractor charges LMC per kilo on monthly basis. Since the hospital does not keep a record of allocation of kilos among units, estimation was taken based on the average monthly bill that details average kilos collected per one month. Based on these data, average $/kilo is estimated per one indicator (see A. 7).

- Laundry Cost

The laundry cost includes cost of washing linen used per occupied bed or operation or any other procedure, allocated cost of purchased linen, maintenance cost, labor cost, indirect cost, and other costs.

On average, linen of one occupied bed are changed three times per day except for ICU patients. The cost of washing linen is calculated by allocating average consumption of detergents to the average number of items washed that is measured by the total capacity of the washing machines. Also labor cost is calculated in the same manner of allocating total costs to average number of items washed.

Washing Machines	Powerline 1	Powerline 2	Girbau	Total
around every 2.5 hours wash per day per washing machine average number of washes per day per washing machine	9.6	9.6	9.6	
number of washing machine	1	2	1	
average total number of washes per day	9.6	19.2	9.6	**38.4**
average number of items in every wash	61	33	44	**138**
average total number of items washed per day	585.6	633.6	422.4	**1641.6**

average detergents consumption per month	$1,764.35	
average consumption per day (including Sundays)	$58.81	
average # of washes per day	38.4	
average number of items washed	1,642	
average cost of detergents per item washed	$0.036	LBP 54.01

average days (whether working or not)/month	30
average COST per month	LBP 4,963,782.40
average transportation/day/staff	LBP 8,000.00
average labor cost per day	LBP 213,459.41
average # of washes per day	38.40

average number of items washed	1,641.60	
average labor cost per wash	5,558.84	
average labor cost in $ per item washed	$0.086	LBP 130.03
average yearly maintenance cost	$1,500	
average daily maintenance cost	$4.167	
average number of items washed per day	1,641.60	
average cost per one item washed per day	$0.0025	LBP 3.83

Fig. 6 Average Cost per One Item Washed per Day

As for the other costs including depreciation, electricity, and other costs, they are calculated on monthly basis and then divided by average items washed to determine total cost per one item washed.

Table 8: Example of average laundry cost per one patient day in Pediatrics unit

Pediatrics	# of linen items per one patient day	3.00
	average total cost per one item washed	187.87
	average total cost per total items	563.60
	other cost	874.83
	Total laundry cost	LBP 1,438.42

For first class and suite admissions, total laundry cost per one patient day increases by around 2,427 LBP for extra shampoos and soaps.

- Maintenance Cost

Total maintenance cost per department includes average ordinary maintenance and contractual maintenance. Contractual maintenance represents costs from contracts signed with firms that should conduct regular check-up visits (whether biomedical or regular) as for ordinary maintenance, it represents average costs that occur outside the contracts. Adding to these costs, labor costs of the department in addition to the other service departments allocation cost (detailed in the next section) and other costs (depreciation…) are added. After calculating total cost, it is allocated to each department then to each indicator using the corresponding allocation base.

Table 9: Allocation Base per Type of Maintenance Cost

Type of maintenance cost	allocation base
Contractual Cost (biomedical and regular)	location/department
Labor cost-biomedical (A. 8)	# of in-house visits per department
Total non-allocated costs	square footage

- Electricity, diesel, & fuel

Average electricity and diesel cost is estimated from the monthly consumption. The allocation base to departments used is the percentage distribution given by the head of maintenance department (based on previous studies). The square footage cannot be used here since the space is not the primary factor in determining the departmental

consumption rather than the number and nature of equipment and machinery that exist in each unit (see A. 9).

- Depreciation

As said before, depreciation cost here is calculated the same as in the P&L. The yearly depreciation cost is calculated using the double declining method and based on percentages preset by the Ministry of Finance. For example:

PPE: 25%

Computer equipment: 50%

Depreciation = Rate* NBV

NBV = Cost - accumulated depreciation

The cost per indicator is calculated by dividing the total cost by the corresponding allocation base (procedure, patient days, # of OR…) (see A. 10).

5. Indirect costs

- Indirect cost allocation cost

As described in the previous section, share per each unit of measure for each profit center is calculated as shown in the following table:

TOTAL MONTHLY INDIRECT TO BE ALLOCATED	LBP 75,745,050				
PROFIT CENTER	% of MONTHLY TOTAL COSTS	INDIRECT COST ALLOCATED (LBP)	UNIT OF MEASURE	MONTHLY STATISTICS	INDIRECT COST ALLOCATED PER UNIT OF MEASURE (LBP)
OR	11.64%	8,818,207	OP	392.9	22,444
OPEN HEART	2.51%	1,899,020	OP	10.6	179,153
OBS	4.15%	3,141,766	PATIENT DAYS	128.22	24,503
CH	0.72%	547,883	PATIENT DAYS	64.73	8,465
PEDIATRICS	2.71%	2,051,610	PATIENT DAYS	147.21	13,937
FF	4.25%	3,220,044	PATIENT DAYS	165.78	19,423
CW	5.44%	4,118,566	PATIENT DAYS	276.41	14,900
MF	4.00%	3,029,373	PATIENT DAYS	330.06	9,178
SF	6.79%	5,143,227	PATIENT DAYS	523.10	9,832
HICU	6.14%	4,650,051	PATIENT DAYS	79.89	58,206
ICN	4.49%	3,398,236	PATIENT DAYS	70.22	48,393
ICU	5.80%	4,392,088	PATIENT DAYS	138.33	31,750
CATH LAB	3.85%	2,918,647	PROCEDURE	84	34,704
ENDOSCOPY	0.82%	624,068	PROCEDURE	72	8,614
KD	4.05%	3,071,318	SESSION	742	4,137
ER	3.18%	2,405,348	PATIENTS	1,233.00	1,951
LAB	13.58%	10,285,717	L	1,145,246	9
RAD	15.88%	12,029,880	R	602,687	20
TOTAL	100.00%	LBP 75,745,050			

Fig. 7 Indirect Cost Allocated per Unit of Measure

- Service departments' allocation cost

As said in the previous section, the step-down method is used in allocating the service departments' costs. The following steps were followed in this allocation:

- The service departments were arranged from serving the most to serving the least.
- Total costs for each department including direct and indirect costs are calculated.
- Allocation bases were chosen for each department in order to give the most accurate figures.
- The allocated cost from one service department to another is added to the total in step 2.
- Total service departments allocated costs are added up to each profit center.

Table 10: Allocation Base per Indirect Cost

	allocation base
administration costs	number of employees per unit
IT costs	# of users/peripherals
accounting costs	departmental size/square footage
procurement costs	% OF sales MS
maintenance costs	square footage
IC costs	Patients load
BE costs	# of visits
pharmacy costs	% of quantity dispensed/% of total cost/% allocated to clinical intervention
MRD costs	Patients load
EHS costs	square footage

	Service Department										
	administration	IT	accounting	procurement	maintenance	IC	BE	pharmacy	MRD	Dietary	Laundry
Cost prior to allocation	50,309,085	4,401,229	40,955,451	11,054,407	38,438,127	4,251,359	22,109,271	11,859,514	16,960,765		
allocation of administration co	50,309,085 →	173,480	4,683,949	1,387,837	1,040,878	173,480	346,959	867,398	520,439	2,255,234.86	1,040,877.63
allocation of IT costs		4,574,709 →	1,034,756	0	54,461	108,922	108,922	272,304	217,843	217,843.28	
allocation of acctg costs			46,674,156 →	79,346	466,742	242,706	233,371	1,166,854	1,400,225	2,170,348.24	1,446,898.83
allocation of procurement costs				12,521,590 →	0	0	0	250,432	0	250,431.80	164,032.83
allocation of maintenance costs					40,000,207 →	200,001.04	200,001.04	239,453.04	606,703.11	1,860,009.64	1,902,456.72
allocation of IC costs						4,976,467 →	0	0.00	0	214,772.04	
allocation of BE costs							22,998,524 →	15,229.04	0		
allocation of pharmacy costs								14,671,184 →	0		
allocation of MRD costs									19,705,974		

Fig 8 Cost Allocation between the Service Departments (monthly basis)

After allocating the costs as shown above, total cost for each department is allocated among the profit centers then cost per indicator is determined (see A. 11). Note that EHS and pharmacy costs are allocated to the profit centers only as the dietary and laundry costs.

F. The Cost Models

The cost models in appendix A.12 summarize all the steps that I have mentioned in the previous sections.

The costs shown in the models are representative of regular admission patients. The costs for upgraded class mainly vary in laundry and dietary costs. Also they exclude cost for patients who are admitted through ER. Around 14.7% of patients coming to ER are admitted. As a result, the cost should increase by the cost of "through ER admission". Also cost per service increases whenever patient increases if he or she is in isolation (mainly cost of medical supplies increases).

Table 11: Summary of Cost per Profit Center

Profit Center	Cost per one patient day	Cost per one OP	Cost per one procedure	Cost per L/R
MF	LBP 148,732.80			
SF	LBP 138,461.98			
MED/SURG	LBP 260,000.78			
CW	LBP 186,628.09			
OBS	LBP 231,015.00			
PEDI	LBP 187,272.78			
CH	LBP 200,148.75			
NURSERY	LBP 222,575.71			
ICU	LBP 431,685.96			
HICU-CCU	LBP 505,620.76			
HICU-CSU	LBP 592,598.21			
ICN	LBP 281,982.41			

OR		LBP 482,419.76		
Open Heart		LBP 4,452,401.21		
Normal Delivery		LBP 296,823.01		
KD			LBP 140,729.59	
Endoscopy			LBP 96,263.69	
Cath Lab			LBP 523,426.09	
ER			LBP 39,586.88	
Laboratory (L)				LBP 139.02
Radiology (R)				LBP 175.71

G. Limitations

The cost models present to the management an overview of the cost of the services offered to the patients. They breakdown all the expenses that are part of the Profit and Loss statement down to the patient measurement level, as cost per one patient day, and so on. As any project, there are limitations that put constraints on the end results. Here are the major ones that exist in this case.

1. These models take into consideration only the accounting costs and do not take into account other costs like opportunity costs (example: patient satisfaction), waiting cost, etc…
2. As said before, some of the data used are given by logs filled by nurses on the floors. This could be found as a limitation since it involves a certain level of human error and biasness. Consequently, the results of the cost models should include a certain margin of error.
3. The history and medical treatment of every patient admitted to the hospital is entered into the billing system, which also summarizes the financial transactions. Yet, this system lacks reporting capability that allows generating reports related to number of patient days, number of kidney

dialysis sessions, and so on. This process will be much more effective if done by the system rather than the staff.

4. Another limitation might be present from the fact that the models are based on data from previous periods, mainly back to 2013 and 2014. As many costs might change or vary with time (salaries, utilities costs, etc.…), the results of the costs models might not reflect the current situation and may become quickly outdated.

H. Recommendations

In order to overcome these limitations, some recommendations are listed here that should help in decreasing the margin of error and the impact of the pitfalls described earlier.

1. Starting from these models, LMC should be able to use cost management in order to increase the efficiency of the services it offers. Knowing the cost at different levels should help identify gaps and tools to improve these gaps by using for example utilization management. To give an example, a comparison for cost per one patient day in different departments could be done in an objective to study the variation in cost, analyze the differences, rectify the gaps (overstaffing, overconsumption in medical supplies, etc..), and list relevant reasons for these differences (for example, depreciation cost is higher in the fifth floor than second floor since it is newer floor physically).
2. As said before, since data used are related to previous periods, these models need to be updated on regular basis in order to reflect better actual figures. As major sources of data used in building these models come from

the different systems that exist at the hospital (accounting, stock, payroll, billing, fixed assets, etc…), it is very crucial to have improvement and continuous update of the IT systems. Developing and upgrading these systems will give more accurate and relevant sources for extracting the data needed. For example, the current accounting system used is a local one with basic tools that only allow data entry with few reports' generation option. Moving on to a more advanced system should give more tools that allow data extraction in an easier and more detailed way, for example, export option to excel, printing trial balance on different levels, and so on… Another example is to improve billing system to be able to give all the data that is given from the logs that are filled manually at the floors. This update will help decrease the human error that highly exists in these data sources.

3. These models should also be used as basis for budgeting objectives. Currently the Finance Department does not develop yearly budgets that offer the management of estimated revenues and costs.

Budgets should be able to estimate and quantify future operations and provide a financial plan for effective cash flow management. The cost models should help strengthen the budgetary process through setting up the basic framework for building these budgets. Departmental budgets should be built using the different cost categories listed in the models while estimating number of patient days, operations, procedures, and so on, that would take place in the budget timeframe. Moreover, actual results

should be calculated and variations should be studied carefully to identify gaps and improve the processes.

4. Before 2006, LMC outsourced the accounting services to a local office in Saida. After changing its legal form to s.a.l. in 2006, the management set a 4-year strategic plan to develop the financial accounting unit and stop outsourcing this service. It expanded its physical structure and assigned an external audit office, KPMG, to conduct yearly audits to assure the compliance to accounting principles. In 2010, the management assigned a CFO and grouped all the three above-mentioned units under one department, the Finance Department (FD).

   In order to do all of the above, LMC management should seriously consider to expand its FD by adding one more unit that should be responsible of updating and enhancing these cost models, developing yearly budgets, controlling figures of costs and revenues on periodical basis, and working on tools of efficient cost management. These cost models will quickly become outdated unless they are maintained; that is why a maintenance process linked to a continuous improvement process is necessary to be put in place mostly be under FD unit.

Currently, the Finance Department at LMC is mainly constituted of the following units: patients' billing, auditing and collection, and general accounting. The general accounting or financial accounting unit is mainly responsible of recording all financial transactions into the accounting system and issuing periodical financial statements.

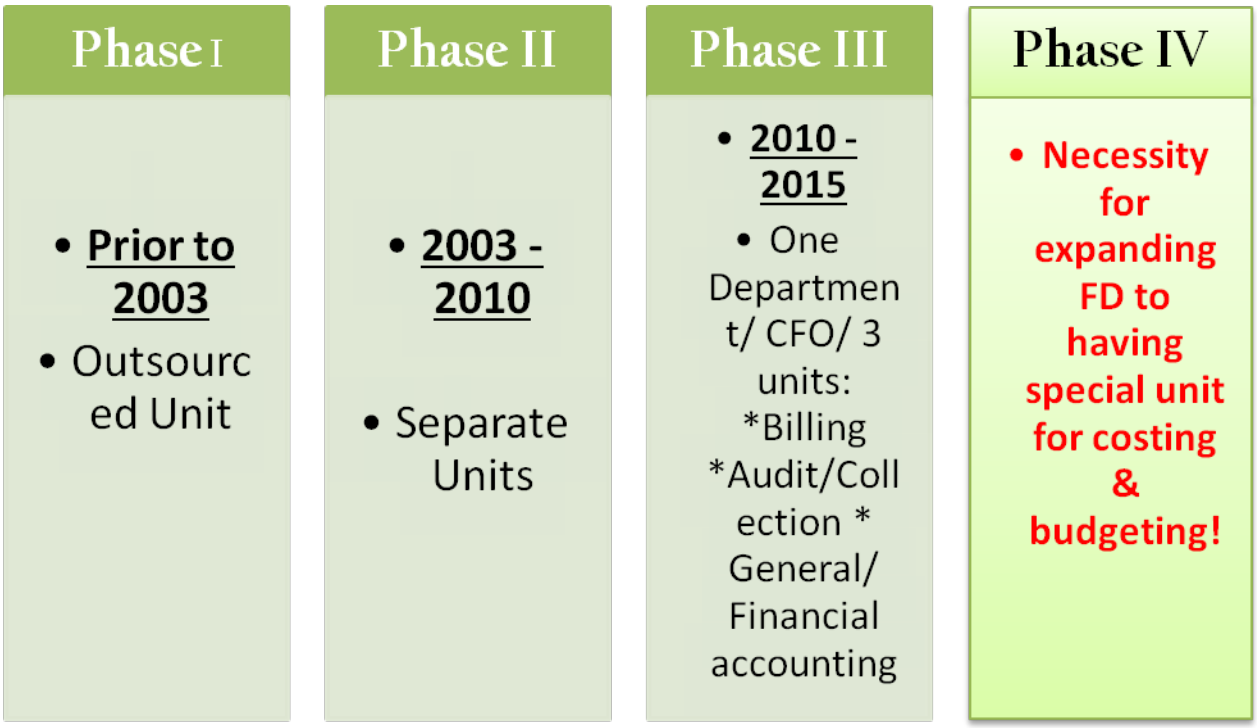


Fig 9 Evolution of the Finance Department

5. Management should be able to use these models to measure profits from the different profit centers identified. It should develop and adjust its system in order to allocate its revenues among the different departments. Once revenues are allocated and using the cost models, LMC will be able to identify and rank its services from the most profitable to the least profitable. This will help taking strategic decisions as to what services to extend and develop and what services to drop.

6. Whenever cost-based pricing is used, LMC management should negotiate its reimbursement agreements with the payers based on actual allocated costs. Prices should be studied in order to identify which services are underpriced and which are fairly priced as the example given above.

I. Conclusion

Evolving from outsourced accounting services to creating a Finance Department with different units and responsibilities, LMC currently faces an opportunity to expand this department by creating a unit responsible of budgeting and cost control, pricing analysis, and efficiency control. To start with, the management of LMC has to have a basis for analysis in order to take strategic decisions. The profit and loss statement shows the overall revenues earned and costs incurred from the services offered to the patients. This project tends to take these costs from this statement and break them down into categories to the patient level to build different models showing cost per services offered through different profit centers. These models should help the management find tools to identify gaps and enhance its efficiency while improving its bottom line.

CHAPTER III

PART 2: PRICING THE CLINIC RENTAL FEES AT LMC

A. Introduction

As mentioned before, LMC has control over the pricing of the rental fees of the clinics used by doctors. This second part evaluates the pricing of such service by first assessing the current situation and the current pricing tactics; secondly by offering different pricing schemes given the currently faced problems (unfairness in fees, overlapping time schedules, and so on).

The clinics part of the hospital incur fixed costs and generate revenues through the fees charged to the Drs. The aim of this part is to try to recommend pricing schemes that would generate more revenues and with that more profits while taking into account the context and the constraints of the Drs. Offering more adequate pricing scheme could be done in different ways, taking into consideration different factors, such as patient load, capacity available, willingness to pay of the doctors, and so on.

A deeper and more rigorous study could follow this project where one could better understand the current environment of clinics, by benchmarking with other institutions, or understanding variation in demand, and differentiate between specialized clinics and general ones. All this is beyond the scope of this part that is primarily focusing on a revenue management approach to pricing that we believe is novel and shows very promising results to be confirmed through possibly a large scale pricing study.

B. Current Situation Assessment

The private clinics area is divided into three main sections in the underground floor of the hospital. It comprises eight clinics managed by three secretaries according to the following distribution:

Table 12: Current Clinical Schedules

Section 1	Doctors		Day Schedule	Time Schedule	average daily patient load	Monthly fees
Clinic #1	A	Dr. Jamil Kaakour	MWS	12 – 1:30.	13-15.	
			TF	9 – 1:30.		150,000
	B	Dr. Afif Toutanji	MTWTHFS	11:30 - 3:30.	10 – 20.	150,000
	C	Dr. Georges Eid	S	8-1.	10-15.	75,000
Clinic #2	D	Dr. Rabie Ashour	TTH	11:30-1.	2-5.	75,000
	E	Dr. Osama hajjar	MW	10-11:30.	2-3.	75,000
	F	Dr. Ahmad fawaz	MTWTHFS	8:30-12.	1-4.	150,000

Section 2	Doctors		Day Schedule	Time Schedule	Patient Load	Monthly fees
Clinic#3	G	Dr. Hassan Mansour	MTWTHFS	12:30-3	5-6.	75,000
	H	Dr. Moussa Dhayni	TTH	11-1.	2-3.	75,000
	I	Dr. Nabil Hourani	WSUN	1-4:30	30-50 (mostly wed)	75,000
			TTH	1-3.	15-20	
	J	Dr. Hisham Hayek	MF	11-4. (in between surgeries)		75,000
Clinic#4	K	Dr. Mohamad Fayyad	TF	8:30-4	20-30	150,000
	L	Dr. Zaher abou alfa	MTWTHFS	10:30-12	3-6	150,000
Clinic#5	M	Dr. Afif hajj shehadeh	M	9-1.	20-30	
			W	1-5-6.		
			F	9-11:30		
			S	9-1:30		150,000
	N	Dr. Adel skakini	MTWTHFS	11-1.	5-7.	150,000
	O	Dr. Reve Kanaan	F	9-2:30	12-16.	150,000
Clinic#6	P	Dr. Fadi Ghandour	TF	10-3.	5-8.	75,000
	Q	Dr. Valentina Kayello	MTH	11-12.	1-3.	150,000
	R	Dr. Hasan Toufayli	MTWTHFS	2-4.	10-20.	75,000
	S	Dr. Maher Balkis	MTWTHFS	10-2.	1-5.	150,000

Section 3	Doctors	Day Schedule	Time Schedule	Patient Load	Monthly fees

Clinic#7	T	Dr. Osama Jradi	MTWTHFS	12-2.	1-6.	75,000
	U	Dr. Souheil Atab	MTWTHFS	10:30-12.	1-5.	150,000
	V	Dr. Ziad Rashidi	MWTH	9:30-10:30.	2-3.	150,000
	W	Dr. Hanan Yasin	WF	12-1.	1	75,000
	X	Dr. Habib ajami	TTHS	9:30-11:30.	10-15.	75,000
				2:30-3:30.		75,000
Clinic#8	Y	Dr. Hazem Bdie	MWTHS	9-12.	15-17	150,000
	Z	Dr. Camille Hajj	MTWTHS	8-1.	20-25	150,000
	AA	Dr. Rodwan Masri	MTWTHFS	10-12.	3-4.	75,000

The doctors currently are divided between part-timers and full-timers and accordingly pay rental fees. The hospital bears the fixed costs including cost of the salaries of the secretaries, the cost of supplies used including stationary and medical supplies cost, and overhead costs (electricity, maintenance, depreciation, etc…). There are many problems currently facing the clinical area, mainly summarized as the following:

- Looking at the above schedules, rental fees seem to be unfair to some doctors paying same fees as other doctors who have more patient load.
- The number of doctors outweighs the number of clinics.
- There is overlapping of the time schedule, i.e., crowding often occurs.
- There is no replacement in case any secretary is absent.
- The costs exceed revenues collected from the rents, in other words, clinics currently operate at a loss. The monthly fees do not even cover the costs of personnel. When the clinics opened, LMC decided to take minimal fees from the doctors and did not make any budget related to this unit. Yet as the hospital increased through years, the administration changed its plans and started to reconsider the pricing of the rental fees.

After assessing the current situation and the problems involved, the following section presents two solutions as to how to improve the outcome of this service.

C. Solution 1: Increase Flat Rate

The first solution is to apply flat rate for all doctors at all time schedules. For that doctors, in one of the medical committee meetings, were asked to give their willingness to pay. Accordingly, the number of doctors who responded with the corresponding percentage was calculated to determine the price that will yield in maximizing total revenues.

WTP (in thousands LBP)	# of Drs	Cum. # of Drs	Cum. % of Drs
400.00	2	2	7.41%
350.00	2	4	14.81%
300.00	3	7	25.93%
250.00	5	12	44.44%
200.00	10	22	81.48%
150.00	5	27	100.00%

Price (in thousands LBP)	Demand	Revenue	Total # of Drs
400.00	2	770	26
350.00	4	1,348	
300.00	7	2,022	
250.00	12	2,889	
200.00	***21***	***4,237***	
150.00	26	3,900	

Fig. 10 WTP/ New Flat Rate/ New Revenues

At flat price of 200,000 LBP, total revenues will be maximized and increased by 34% from the current situation yet the problem of scheduling will not be solved.

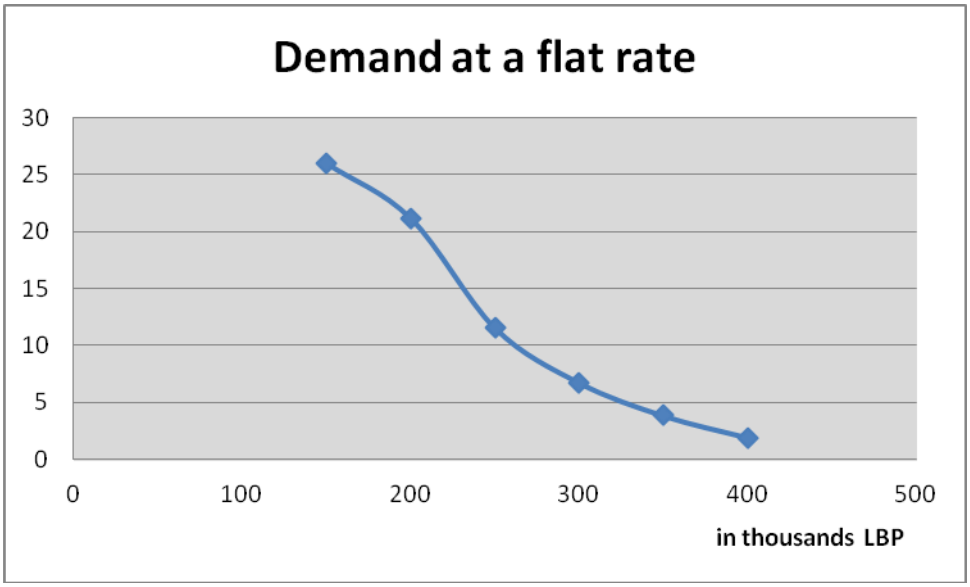


Fig. 11 Demand at Flat Rate

This solution is easy to apply since the only variable that will change is the price charged for rental while keeping the same context as it is which makes it easier for the doctors to apply. Yet by increasing the flat rate charged increases revenues generated, this solution does not give optimal results and does not solve the other problems incurring such as overlapping schedules. For that, the second solution attempts to take into consideration other factors than prices, mainly the allocation of clinics among doctors trying to reorganize the schedules while maximizing revenues and holding the doctors' satisfaction.

D. Solution 2: Slots allocation and pricing

The second solution is to divide time schedules into slots and price the rental fees accordingly. This solution is based on the assumption that all clinics are homogeneous and can be used by all doctors despite minor differences that can be fixed in order to maximize utilization and revenues.

1. Number of Slots Needed

Every day can be divided into two slots:

- Morning Slot: 8 a.m. – 12 p.m.

- Afternoon Slot: 12 p.m. – 4 p.m.

One slot is equal to 4 hours; consequently, one operating week is equal to twelve slots per one clinic. From the data collected as summarized in the tables above and from the average time in hours needed per each patient, minimum number of slots currently needed by doctors is determined. It is worth noting that overall utilization of slots is 93.75% (90 out of 96 slots).

#	Name of doctor	average weekly patient load	average time needed per patient (in hours)	Total average number of weekly hours needed	average number of slots needed (rounded up)
D1	Dr. Jamil Kaakour	70	0.33	23.1	5
D2	Dr. Toutanji	90	0.25	22.5	6
D3	Dr. Eid	13	0.33	4.29	2
D4	Dr. ashour	6	0.33	1.98	1
D5	Dr. Osama hajjar	6	0.25	1.5	1
D6	Dr. ahmad fawaz	18	0.33	5.94	2
D7	Dr. Mansour	36	0.5	18	5
D8	Dr. Dhayni	6	0.25	1.5	1
D9	Dr. Hourani	80	0.25	20	5
D10	Dr. Hayek	68	0.25	17	5
D11	Dr. Fayyad	50	0.33	16.5	5
D12	Dr. zaher abou alfa	30	0.33	9.9	3
D13	Dr. afif hajj shehadeh	100	0.25	25	7
D14	Dr. adel skakini	36	0.33	11.88	3
D15	Dr. Reve Kanaan	14	0.5	7	2
D16	Dr. Fadi Ghandour	12	0.33	3.96	1
D17	Dr. Kayello	4	0.5	2	1
D18	Dr. Hasan Toufayli	90	0.25	22.5	6
D19	Dr. Balkis	18	0.25	4.5	2
D20	Dr. Osama Jradi	24	0.25	6	2
D21	Dr. atab	18	0.33	5.94	2
D22	Dr. Ziad Rashidi	9	0.5	4.5	2
D23	Dr. Hanan Yasin	2	0.33	0.66	1
D24	Dr. Habib ajami	39	0.5	19.5	5
D25	Dr. Bdie	64	0.25	16	4
D26	Dr. Hajj	115	0.25	28.75	8
D27	Dr. Masri	24	0.5	12	3
				Total	**90**

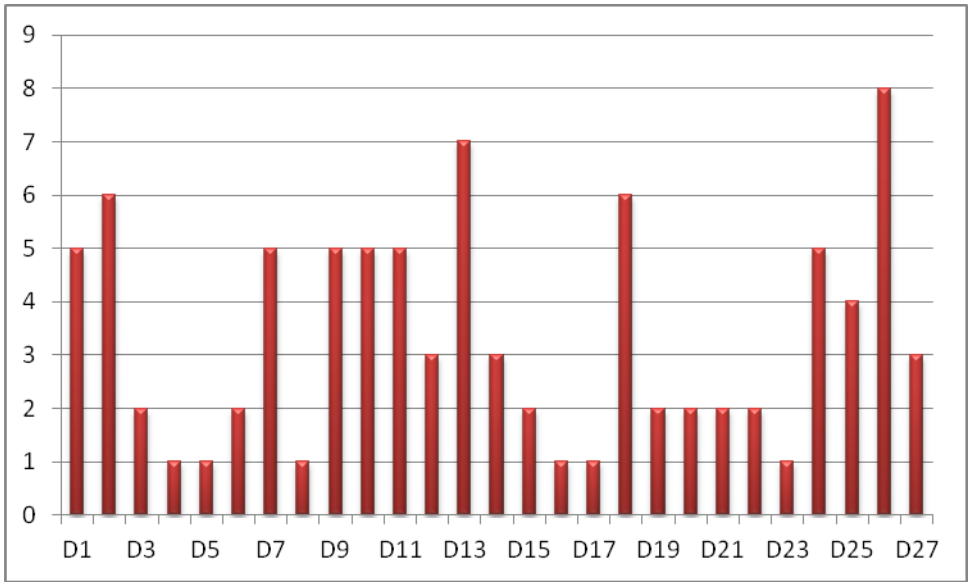


Fig. 12 Minimum Number of Slots Needed per Doctor

2. Grid for weekly slots allocation

Doctors were asked to fill the slots they prefer to reserve for their time schedules at the clinics. Accordingly, a grid for weekly slots allocation is drawn dividing the area into three sections:

- Area with high demand: DH
- Area with medium demand: DM
- Area with low demand: DL

	M1	M2	T1	T2	W1	W2	TH1	TH2	F1	F2	S1	S2	Total Slots
D1		1	1			1			1			1	5
D2		1		1		1		1		1		1	6
D3	1										1		2
D4			1										1
D5					1								1
D6	1						1						2
D7		1		1		1		1		1			5
D8					1								1
D9				1	1	1					1	1	5
D10		1		1	1			1		1			5
D11			1	1				1	1	1			5
D12	1							1		1			3
D13	1	1		1		1		1	1		1		7
D14			1			1			1				3
D15									1	1			2
D16				1									1
D17							1						1
D18		1		1				1		1	1	1	6
D19					1			1					2
D20	1											1	2
D21					1						1		2
D22							1		1				2
D23					1								1
D24	1			1				1		1		1	5
D25	1				1				1		1		4
D26	1			1	1		1	1	1	1	1		8
D27	1								1		1		3
Total number of daily slots	9	6	4	10	9	6	4	10	9	9	8	6	90

High Demand (DH)
Medium Demand (DM)
Low Demand (DL)

F

Fig. 13 Weekly Grid

Total capacity for each day is equal to the total number of clinics * daily number of slots per one clinic = 8 clinics * 2 slots = 16 slots.

3. Willingness to pay (WTP) for each doctor

After drawing the grid and dividing it into three sections, doctors were asked to give their WTP for each section. Determining the WTP will enable us to calculate the net utility for each doctor, where net utility is equal to WTP – price.

WTP in Lebanese Pounds	High	Medium	Low
D1	25,000	20,000	15,000
D2	25,000	25,000	15,000
D3	25,000	15,000	15,000
D4	25,000	20,000	25,000
D5	25,000	10,000	15,000
D6	30,000	20,000	15,000
D7	30,000	25,000	15,000
D8	35,000	15,000	20,000
D9	40,000	35,000	20,000
D10	45,000	35,000	25,000
D11	45,000	20,000	30,000
D12	35,000	20,000	20,000
D13	35,000	25,000	20,000
D14	25,000	25,000	25,000
D15	30,000	20,000	20,000
D16	40,000	15,000	15,000
D17	40,000	18,000	25,000
D18	35,000	25,000	20,000
D19	40,000	15,000	20,000
D20	35,000	30,000	15,000
D21	35,000	25,000	20,000
D22	40,000	25,000	30,000
D23	35,000	15,000	15,000
D24	40,000	15,000	15,000
D25	35,000	15,000	20,000
D26	30,000	20,000	20,000
D27	30,000	18,000	15,000

Fig. 14: WTP per Doctor per Section

4. Model version 1

The objective of this model is to optimize using Solver the allocation of the slots among the doctors during the week and determine the prices for each section that maximize total revenues generated with positive total net utilities.

The variables are the weekly slots and the prices for the sections drawn from the grid in the above section.

Total net utility is equal to the sum of all net utilities of all doctors calculated as:

(WTP - Price) * Number of allocated slots per section

Total revenues are equal to price per each section multiplied by total number of slots for the same section.

Three constraints: the first constraint is that total slots to be allocated for each doctor is equal or less than the minimum slots needed as determined in the first section. The second constraint is that total slots filled for each day is equal or less than the total capacity of the total clinics. The final constraint is that the net utilities are positive.

	PH	PM	PL
Price (in LBP)	35,000	21,535	10,892

	Net Utility (in LBP)			
	DH	DM	DL	Total Utility
D1	0	(5,587)	5,587	0
D2	(15,441)	15,441	0	0
D3	(5,824)	0	5,824	0
D4	(5,852)	0	5,852	0
D5	(2,912)	0	2,912	0
D6	(4,510)	0	4,510	0
D7	(10,341)	9,182	1,159	(0)
D8	(0)	0	0	(0)
D9	25,000	0	0	25,000
D10	50,000	0	0	50,000
D11	43,428	(1,009)	0	42,419
D12	(0)	0	0	(0)
D13	(0)	7,342	0	7,342
D14	(17,319)	186	17,132	0
D15	(6,382)	(30)	6,412	0
D16	5,000	0	0	5,000
D17	5,000	0	0	5,000
D18	(0)	5,203	0	5,203
D19	8,443	(2,035)	0	6,407
D20	(0)	0	0	(0)
D21	(0)	1,567	0	1,567
D22	10,000	0	0	10,000
D23	(0)	0	0	(0)
D24	18,534	(8,451)	0	10,082
D25	(0)	0	0	(0)
D26	0	(10,507)	10,507	0
D27	(6,766)	0	6,766	0
Total U (in LBP)	90,057	11,303	66,661	168,021

	Weekly Distribution of Slots			Total Slots	Constraint 1	Minimum # of weekly slots needed
	DH	DM	DL			
D1	0	3.640132805	1.3598672	5	<=	5
D2	1.5440979	4.455902116	0	6	<=	6
D3	0.5823813	0	1.4176187	2	<=	2
D4	0.5852028	0	0.4147972	1	<=	1
D5	0.2911906	0	0.7088094	1	<=	1
D6	0.9020841	0	1.0979159	2	<=	2
D7	2.0681908	2.649649584	0.2821596	5	<=	5
D8	1	0	0	1	<=	1
D9	5	0	0	5	<=	5
D10	5	0	0	5	<=	5
D11	4.3427709	0.657229109	0	5	<=	5
D12	3	0	0	3	<=	3
D13	4.8811978	2.118802223	0	7	<=	7
D14	1.731861	0.05379228	1.2143467	3	<=	3
D15	1.2764317	0.019564432	0.7040039	2	<=	2
D16	1	0	0	1	<=	1
D17	1	0	0	1	<=	1
D18	4.4985507	1.501449325	0	6	<=	6
D19	1.6885312	0.311468789	0	2	<=	2
D20	2	0	0	2	<=	2
D21	1.5476599	0.45234007	0	2	<=	2
D22	2	0	0	2	<=	2
D23	1	0	0	1	<=	1
D24	3.7067232	1.293276819	0	5	<=	5
D25	4	-1.6005E-11	0	4	<=	4
D26	0	6.846392449	1.1536076	8	<=	8
D27	1.3531261	0	1.6468739	3	<=	3
Total number of daily slots	56	24	10	90		90
Constraint 2	^ =	^ =	^ =	^ =		
Total number of available slots	56	24	16	96		
Total Revenues (R in LBP)	1,960,000	516,833	108,918	2,585,751		
R+U (inLBP)	2,050,057	528,136	175,579	2,753,773		

allocated slots rounded to 0 digits		
0	4	1
2	4	0
1	0	1
1	0	0
0	0	1
1	0	1
1	3	1
1	0	0
5	0	0
5	0	0
4	1	0
3	0	0
5	2	0
2	0	1
1	0	1
1	0	0
1	0	0
4	2	0
2	0	0
2	0	0
2	0	0
2	0	0
1	0	0
4	1	0
4	0	0
0	7	1
1	0	2
56	24	10

Weekly Slots allocation	Price (in LBP)	Demand Optimized	Total Revenues	Total Net Utility
Slots with high demand	35,000	56	1,960,000	90,057
Slots with medium demand	21,535	24	516,833	11,303
Slots with low demand	10,892	10	108,918	66,661
Total		**90**	**2,585,751**	**168,021**

Fig. 15 Model Version 1

5. Model version 2

This version is the same model as version 1 with an objective of optimizing the allocation of the slots among the doctors during the week and determining the prices for each section that maximize the sum of total revenues generated and total net utilities.

	PH	PM	PL
Price (in LBP)	30,085	20,000	8,520

	Net Utility (in LBP)			
	DH	DM	DL	Total Utility
D1	0	0	0	0
D2	(15,126)	15,126	0	0
D3	(5,698)	0	5,698	0
D4	0	0	0	0
D5	(2,849)	0	2,849	0
D6	0	0	0	0
D7	0	25,000	0	25,000
D8	4,915	0	0	4,915
D9	0	75,000	0	75,000
D10	74,576	0	0	74,576
D11	74,576	0	0	74,576
D12	14,746	0	0	14,746
D13	34,407	0	0	34,407
D14	0	0	49,440	49,440
D15	0	0	22,960	22,960
D16	9,915	0	0	9,915
D17	9,915	0	0	9,915
D18	29,491	0	0	29,491
D19	19,830	0	0	19,830
D20	0	20,000	0	20,000
D21	9,830	0	0	9,830
D22	0	0	42,960	42,960
D23	4,915	0	0	4,915
D24	49,576	0	0	49,576
D25	19,661	0	0	19,661
D26	(456)	0	30,043	29,587
D27	(251)	0	251	(0)
Total U (in LBP)	331,975	135,126	154,201	621,302

	Weekly Distribution of Slots			Total Slots	Constraint 1	Minimum # of weekly slots needed
	DH	DM	DL			
D1	0	5	0	5	<=	5
D2	2.9747864	3.02521362	0	6	<=	6
D3	1.120642	0	0.879358	2	<=	2
D4	0	1	0	1	<=	1
D5	0.560321	0	0.439679	1	<=	1
D6	0	2	0	2	<=	2
D7	0	5	0	5	<=	5
D8	1	0	5.771E-09	1	<=	1
D9	0	5	0	5	<=	5
D10	5	0	0	5	<=	5
D11	5	0	0	5	<=	5
D12	3	0	0	3	<=	3
D13	7	0	0	7	<=	7
D14	0	0	3	3	<=	3
D15	0	0	2	2	<=	2
D16	1	0	0	1	<=	1
D17	1	0	2.212E-08	1	<=	1
D18	6	0	0	6	<=	6
D19	2	0	0	2	<=	2
D20	0	2	0	2	<=	2
D21	2	0	5.771E-09	2	<=	2
D22	0	0	2	2	<=	2
D23	1	0	0	1	<=	1
D24	5	0	0	5	<=	5
D25	4	0	0	4	<=	4
D26	5.382984	0	2.617016	8	<=	8
D27	2.9612666	0	0.0387334	3	<=	3
Total number of daily slots	56	23	10.974786	90		
Constraint 2	^ =	^ =	^ =	^ =		
Total number of available slots	56	24	16	96		
Total Revenues (R in LBP)	1,684,746	460,504	93,506	2,238,756		
R+U (inLBP)	2,016,721	595,630	247,707	2,860,058		

allocated slots rounded to 0		
0	5	0
3	3	0
1	0	1
0	1	0
1	0	0
0	2	0
0	5	0
1	0	0
0	5	0
5	0	0
5	0	0
3	0	0
7	0	0
0	0	3
0	0	2
1	0	0
1	0	0
6	0	0
2	0	0
0	2	0
2	0	0
0	0	2
1	0	0
5	0	0
4	0	0
5	0	3
3	0	0
56	23	11

Weekly Slots allocation	Price (in LBP)	Demand Optimized	Total Revenues	Total Net Utility
Slots with high demand	30,085	56	1,684,746	331,975
Slots with medium demand	20,000	23	460,504	135,126
Slots with low demand	8,520	11	93,506	154,201
Total		**90**	**2,238,756**	**621,302**

Fig. 16 Model Version 2

6. Comparison of Results

Total Demand	**90**	
Objective	**Max R**	**Max R+U**
Total Slots allocated	90	90
DH	56	56
DM	24	23
DL	10	11
PH	35,000	30,085
PM	21,535	20,000
PL	10,892	8,520
Total Revenues (in LBP)	2,585,751	2,238,756
Total Utility (in LBP)	168,021	621,302
Total Revenues+Utility (in LBP)	2,753,773	2,860,058

	Total Revenues (in LBP)	**% (from initial)**
Monthly Revenues (initial)	3,150,000	-
Monthly Revenues using flat rate	4,200,000	33.33%
Monthly Revenues with optimization 1	10,343,006	228.35%
Monthly Revenues with optimization 2	8,955,026	184.29%

Fig. 17 Comparison of Results

Clearly, the second solution (with the two versions) gives much higher results than the first one. Although there is a slight difference in the slots allocation between the two versions along with a minor difference in prices, yet total revenues generated differ by around 13% difference in total revenues generated.

Since the approach followed here is driven by the doctors' willingness to pay, this presents a limitation since this WTP might not be accurate or might change with time or be affected by different factors (patient load, seasonality, doctors' income, etc…). Also, the doctors might be resistant as to the allocation of the slots especially if their preferences change, for example, from one season to another. On the other hand, looking from the doctors' point of view as to the amount paid on monthly basis, most

doctors will end up paying much higher fees than before, which might also takes time to be assimilated by these doctors, even though these prices were determined starting from their WTP.

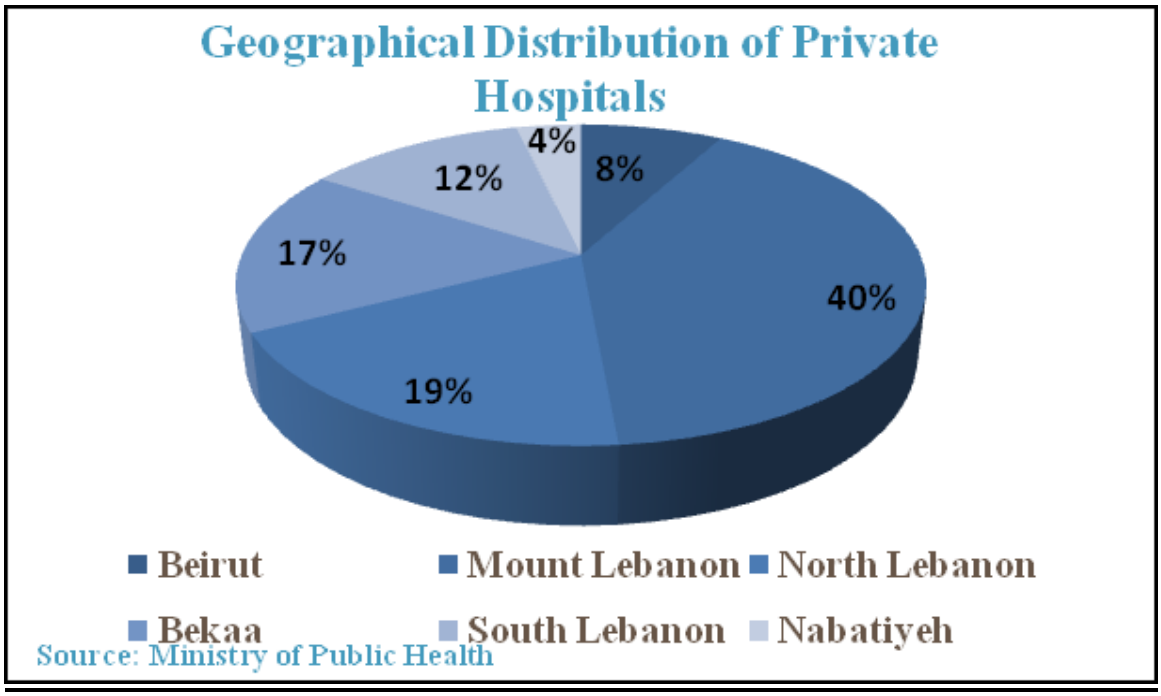
As a result, whenever applied, the management should set specific policy including the allocation of the slots, prices, and eligible duration that the doctors should be committed to. The duration should be specified after mutual agreement with the doctors taking into consideration their preferences, seasonality, and other factors.

E. Conclusion

LMC currently hosts a clinical center that operates at loss. It has an opportunity to manage this center by dividing the time schedules into slots that are allocated to doctors. This allocation can be optimized by identifying different sections for demand and building a simple model using Solver to find the best distribution along with price for each section with an objective to maximize revenues with positive net utilities. The major input for this model is willingness to pay of each doctor for each identified section used in calculating the net utilities. In conclusion, the results of these models increase revenues at a higher level than offering one flat rate.

APPENDICES

A. 1:



A. 2: Statistics/data

OR	average monthly	OPEN HEART
January	388	6
February	364	11
March	388	10
April	330	8
May	418	16
June	407	12
July	363	9
August	449	12
September	445	9
October	377	13
Average	**392.90**	**10.6**
Average 6 months	**382.50**	**10.5**
Total 6 months	**2295.00**	**63**
Daily average	**15.11**	

OBS		
Quarterly	Delivery	C-Section
First	68	78
Second	88	98
Third	88	118
Total	244	294
Average/month	27.11111	32.66667
Average/6 month	78	88
Total/6 month	156	

CATH	January	February	March	April	May	June	July	August	September	Total
Arteriography	4	5	3	7	11	4	4	6	7	51
Coro	61	63	74	78	74	53	50	58	51	562
PTCA	20	14	16	16	20	17	11	15	11	140
Total	85	82	93	101	105	74	65	79	69	753

ENDOSCOPY	January	February	March	April	May	June	July	August	September	Total
Gastroscopy	25	30	37	41	43	45	38	43	50	352
Colonoscopy	10	11	7	26	37	27	17	26	23	184
Bronchoscopy	10	17	13	12	16	12	9	5	8	102
Laryngoscopy	2	1	2	0	3	1	2	1	2	14
Total	47	59	59	79	99	85	66	75	83	652
						428				

KD	January	February	March	April	May	June	July	August	September	Total
Regular Sessions	701	616	707	724	758	701	766	735	735	6,443
Patients	65	65	68	70	69	71	71	70	70	619
Extra Sessions	37	12	23	30	36	21	23	14	25	221
Urgent Sessions	4	0	4	5	0	4	0	0	1	18
Total	742	628	734	759	794	726	789	749	761	

Patients' days	January	February	March	April	May	June	July	August	September	average
CW	384.25	331.42	277.92	234.75	264.46	225.83	261.21	262.17	245.67	276.41
SF	556.92	533.92	550.96	523.92	503.88	452.38	423.83	569.63	592.5	523.10
MF	341	280	336	336	342	323	320	355	337.5	330.06
HICU	95	68	80	84	91	58	70	92	81	79.89
ICU	155	136	147	131	128	142	146	127	133	138.33
Pediatric	165.17	143.38	139.67	153.25	141.46	155.46	132.17	157.25	137.08	147.21
Nursery	73	63	63	72	106.33	100	83.46	113.21	109	87.00
NICU	104	68	75	49	91	49	51	90	55	70.22
SDS	249.79	227.96	289.29	261.96	216.25	214	200	248	258	240.58
OBS/GYN	124.5	96.92	137	114.46	138.83	134.67	131.25	148.92	127.42	128.22
5th medical –surgical	179.83	145.67	173.71	194.5	144.88	136.79	185.25	181.58	149.83	165.78
CH(ONCOLOGY)	55.83	48.75	69.42	69.58	79.79	72.04	69.96	67	50.17	64.73

Meals census (9 MONTHS)	57,917
Lab (9 months L)	10,307,213
Rad (9 months R)	5,424,180

Month	ER Patients	admissions through ER
January	1167	187
February	1065	151
March	1207	231
April	1241	163
May	1312	163
June	1208	148
July	1312	224
August	1474	243
September	1111	121
average	**1233**	**181.22**

Unit	Space in m^2	
KD	350.00	5.43%
Endoscopy	50.00	0.78%
administration	300.00	4.65%
MF	300.00	4.65%
First Floor	**1,000.00**	**15.50%**
Lab	350.00	5.43%
Rad	350.00	5.43%
OR	300.00	4.65%
Ground Floor	**1,000.00**	**15.50%**
ICU	**300.00**	**4.65%**
ER	**450.00**	**6.98%**
Pediatric	450.00	6.98%
Chemotherapy	100.00	1.55%
SF	450.00	6.98%
Second Floor	**1,000.00**	**15.50%**
HICU	230.00	3.57%
Open Heart	250.00	3.88%
Cath Lab	70.00	1.09%
CW	450.00	6.98%
Fourth Floor	**1,000.00**	**15.50%**
OBS/GYN	300.00	4.65%
NICU	150.00	2.33%
MED/SURG	550.00	8.53%
Fifth Floor	**1,000.00**	**15.50%**
Laundry	**200.00**	**3.10%**
Dietary	**300.00**	**4.65%**
Extensions	**200.00**	**3.10%**

A. 3:

Examples of calculating unit labor cost:

OR	
OR	39,127.85
Recovery	7,452.44
Anesthesia	30,229.21
CSSR	9,337.57
Clinical nurse	3,044.43
average labor cost per OR	**LBP 89,191.50**

Example:

Average days (from Monday to Saturday)/month/nurse	26
Average # OR per month	393
Average # OR per day	15.12
Average of nurses needed in each OR	3.00
Total average labor needed per day	45.35
Average number of nurses on schedule per day	9.00
Average # OR per day per nurse	5.04
Average COST/month/nurse	1,186,677.96
Average COST/day/nurse	45,641.46
Average transportation/day/nurse	8,000
Total average labor cost/day	**53,641.46**
Average labor cost/Nurse/OR/day	**10,646.40**

OBS	**Normal Delivery**	**Post-Normal Delivery**	**C-Section**	**Post-C-Section**
Nurses/shift	1 RN	1 RN: 4 patients, PN for day shift	1 RN: 4 patients, PN for day shift	1 RN: 4 patients, PN for day shift
average staffing cost/ patient/ day	**37,961.66**	**63,942.40**		

Example:

RNs	
Average days (whether working or not)/month/nurse	30
Average # of RNs per day shift	1
Average # of RNs per night shift	2
Number of beds	10
Average # of patients per day shift per nurse	10
Average # of patients per night shift per nurse	5
Average occupancy rate per day	42%
Average COST/month/RN/**day or night** shift	1,386,961.55
Average COST/day/RN/**day or night** shift	46,232.05
Average transportation/RN/**day or night**	8,000
Total average labor cost/day or night/RN	**54,232.05**
Average labor cost/RN/one patient day	**38,533.30**

	labor COST*	TOTAL TESTS	TOTAL L	DIRECT labor COST PER L
BLOOD BANK	$16,800.84	6,267	1,884,625	**$0.0089**
CHEMISTRY	$160,901.79	126,257	4,203,507	**$0.0383**
TUMERMARKERS	$2,227.86	1,015	184,319	**$0.0121**
PARASITOLOGY-BACTERIOLOGY	$55,021.89	19,968	740,500	**$0.0743**
SEROLOGY-IMMUNOLOGY	$23,455.83	7,786	834,563	**$0.0281**
HEMATOLOGY	$56,617.03	26,670	1,063,961	**$0.0532**
COAGULATION	$24,594.15	12,154	762,190	**$0.0323**
ENDOCRINOLOGY	$9,923.31	4,521	633,548	**$0.0157**
TOTAL	$349,542.70	204,638	10,307,213	**$0.0339**

A. 4:

Examples of calculating MS cost:

OR Classification		Minor Surgeries		Medium Surgeries		Major Surgeries	
Medical Supplies	**Unit Price**	**average quantity used**	**average cost**	**average quantity used**	**average cost**	**average quantity used**	**average cost**
Surgical Gloves (unit)	0.5	8	4	12	6	40	20
Disposable Gloves (unit)	0.005	16	0.08	40	0.2	60	0.3
Surgical Face Mask	0.09	6	0.54	7	0.63	9	0.81
Hair Cover	0.022	6	0.132	7	0.154	9	0.198
Shoes Cover (unit)	0.043	12	0.516	14	0.602	18	0.774
Normal Saline (bags)	1.5	3	4.5	4	6	5	7.5
Underpad	0.0783	1	0.0783	2	0.1566	3	0.2349
Surgical Blade	0.08	2	0.16	3	0.24	4	0.32
Suture / ethilon	1.8	2	3.6	2	3.6	2	3.6
Suture / vicryl	3	4	12	12	36	30	90
Betadine (500ml)	1.33	1	1.33	2	2.66	3	3.99
Suction catheter	0.2	1	0.2	1	0.2	2	0.4
Surgical brush	0.37	2	0.74	3	1.11	4	1.48
OP-Flex set pump yankaeur	0.32	2	0.64	2	0.64	2	0.64
'ASEPTO BULB SYRINGE WITH TIP PROTECTOR 80/BX	0.5	1	0.5	1	0.5	1	0.5
FOLEY CATHETER # 2WAY ,15CC	0.52					1	0.52
KIDNEY SHAPED BASIN 500cc DISPOSABLE	0.3	2	0.6	2	0.6	2	0.6
Cautery	4.5	1	4.5	1	4.5	2	9
REMPOLYHESIVE II CORDLESS (POUCH OF 50 PLATES)	3.9	1	3.9	1		1	3.9
STERI-STRIP 12*100 (L) 1/2"X4" (R1547) 3M 50/BOX	0.85	1	0.85	1	0.85	1	0.85
Portovac/Hemovac	12	1	12	2	24	3	36
Total average direct MS			**$50.866**		**$88.643**		**$181.617**

Monthly Floor Store Request:

Medical Supplies	Unit Price	Monthly average quantity used	average daily cost
Omnifix 10 cm	4.65	8.00	1.43
Omnifix 15 cm	7.50	6.00	1.73
Betadine (gallons)	6.00	10.00	2.31
Skinmansoft	5.85	16.00	3.60
Incidin Foam	15.60	8.00	4.80
Skincept (gallons)	6.50	4.00	1.00
Alcool (bottle)	2.25	8.00	0.69
Dakin	5.00	3.00	0.58
Sekucept	15.60	12.00	7.20
Plaster adhesive (roll)	2.00	20.00	1.54
Plaster anti-allergic 1 inch	0.69	6.00	0.16
Plaster anti-allergic (transpore) 4 cm/ inch	11.00	4.00	1.69
Sharpack 22 Liters	9.00	2.00	0.69
Sharpack 12 Liters (3 on 01/08)	5.50	0.38	0.08
Sharpack 6 Liters (2 on 01/09)	4.50	0.22	0.04
'ALPHADINE SOLUTION LITER/POVI IODINE 1001LITER 10%	9.77	48.11	18.08
1069209 LYOSTYP 10 X 12 CM (GELFOAM PACK OF 4)	9.97	2.11	0.81
Plaster anti-allergic (transpore) 6 cm/ inch	11.00	4.00	1.69
Gauze roll	15.00	26.00	15.00
'88761-AUB UNIVERSAL PACK (5/CASE)	20.00	4.00	3.08
PG585310/6 MANISOFT LITER (MANUCLEAR)	3.48	3.33	0.45
PG855570/020 SEKUSEPT 200 ML (SEKUCID)	13.02	7.44	3.73
SEKULYSE LITER (6/GAL)(PG85580/6)	15.19	24.00	14.02
Tongue depressor	0.01	11.11	0.00
Batteries		2.24	0.09
SKIN MARKER AND RULER STERILE 25/BX	2.17	19.11	0.74
SKIN STAPLER (8037-12) 6/BX	8.00	11.11	3.42
102,02 ANTI-FOG SOLUTION FOR ENDOSCOPES	7.38	2.89	0.82
Gauze sterilux (pieces)	0.08	3000.00	8.65
Total cost of monthly floor request allocated daily			$98.109
Average daily operations			15.12
Total cost of monthly floor request allocated daily and per operation			**$6.49**

A. 5:

Summary of cleaning costs

	Staff	Night	Supervisors	Other staff	Supplies	Other	Total
Fifth Floor	$1.7730	$0.5670	$0.3331	$0.2889	$1.1723	$1.1048	**$5.2391**
Fourth Floor	$1.4033	$0.5670	$0.3331	$0.2889	$1.1809	$1.1048	**$4.8781**
Second Floor	$1.2300	$0.5670	$0.3331	$0.2889	$0.5309	$1.1048	**$4.0547**
ICU	$2.3133	$0.5670	$0.3331	$0.3372	$1.6970	$1.1048	**$6.3523**
MF	$1.2119	$0.5670	$0.3331	$0.2889	$0.9096	$1.1048	**$4.4153**
KD	$0.49		$0.15	$0.20	$0.25	$0.51	**$1.6129**
OR	$1.02		$0.32	$0.41	$1.00	$1.06	**$3.8048**
open heart	$9.43		$0.00	$0.19	$2.84	$0.00	**$12.4622**
cath lab	$2.38		$1.49	$0.10	$1.79	$4.93	**$10.6774**
XRaY	$0.0003318		$0.00	$0.0001438	$0.00033	$0.000688	**$0.0017**
Lab	$0.0001746		$0.00	$0.0000757	$0.00017	$0.000362	**$0.0009**

A. 6:

Summary of stationary costs

Unit	CONSUMPTION 9 MONTHS	Unit of measure	**$ / unit of measure**
RADIOLOGY	$6,854.03	5,424,180	**$0.0013**
LABORATORY	$5,404.57	10,307,213	**$0.0005**
KIDNEY DIALYSIS	$1,821.29	6682	**$0.2726**
OR	$5,696.45	3552	**$1.6037**
SF	$7,696.13	4707.94	**$1.6347**
PEDIATRICS	$602.44	1324.89	**$0.4547**
SAME DAY SURGERY	$212.81	2165.25	**$0.0983**
ONCOLOGY	$841.26	582.54	**$1.4441**
MF	$3,800.83	2970.50	**$1.2795**
ICU	$1,412.50	1245.00	**$1.1345**
NURSERY	$24.50	783.00	**$0.0313**
OBS/GYN	$1,836.74	1153.97	**$1.5917**
MEDICAL SURGICAL	$3,899.71	1492.04	**$2.6137**
NICU	$623.91	632.00	**$0.9872**
CARDIAC CATH	$1,438.58	753	**$1.9105**
CARDIAC WARD	$4,140.42	2487.68	**$1.6644**
CCU	$1,691.94	719.00	**$2.3532**
OPEN HEART	$697.42	93	**$7.4991**
ENDOSCOPY	$271.38	652	**$0.4162**

A. 7:
Summary of waste management costs

Arcenciel	monthly kilos
OCTOBER	3,024
SEPTEMBER	3,498
AUGUST	3,745
JULY	3,655
APRIL	3,527
MARCH	3,038
FEBRUARY	4,135
JANUARY	4363
average monthly total kilos	3,623

Waste Management allocation cost per unit of measure	average kilos per unit	average $ per average kilos
monthly average ward patient days	0.87	$0.48
monthly average ICU patient days	1.31	$0.72
monthly average cath lab procedures	0.87	$0.48
monthly average open heart	1.75	$0.96
monthly average OR	1.75	$0.96
monthly average deliveries	1.31	$0.72
monthly average endoscopy	0.87	$0.48
monthly average KD sessions	0.87	$0.48

A. 8:

Labor cost for biomedical maintenance unit:

	# equipment	In-house	Total # visits/unit		Total
		# visits/year	Yearly	Monthly	labor cost
CATH LAB	8	2	16	1.33	44,351.18
Endoscopy	7	2	14	1.17	38,807.29
ER	25	2	50	4.17	138,597.45
HICU	50	2	100	8.33	277,194.90
ICU	43	2	86	7.17	238,387.61
KD	9	2	18	1.50	49,895.08
LAB	35	2	70	5.83	194,036.43
MF	21	2	42	3.50	116,421.86
FF	22	2	44	3.67	121,965.76
NICU	26	2	52	4.33	144,141.35
	10	1	10	0.83	27,719.49
OBS	37	2	74	6.17	205,124.23
	1	1	1	0.08	2,771.95
OPEN HEART	19	2	38	3.17	105,334.06
OR	48	2	96	8.00	266,107.10
PEDIATRIC	17	2	34	2.83	94,246.27
PHARMACY	2	2	4	0.33	11,087.80
RAD	6	2	12	1.00	33,263.39
	2	1	2	0.17	5,543.90
SF	28	2	56	4.67	155,229.14
	11	1	11	0.92	30,491.44
CARDIAC WARD	37	2	74	6.17	205,124.23
Total			**915**	**76.25**	**2,536,333.33**
Total labor cost allocated to in-house / month			**2,536,333.33**		
Total labor cost allocated to in-house /visit			**33,263.39**		

Total labor cost allocated to in-house /visit / day/unit/bed or procedure					
	# beds	**occupancy rate**	**occupied bed**	**Cost per month**	**Cost per bed (whether occupied or not)**
OBS	10	42.22%	4.22	207,896.17	20,789.62
ICN	6	46.56%	2.79	171,860.84	10,741.30
NURSERY	10	31.78%	3.18		
CCU	4	66.22%	2.65	277,194.90	46,199.15
CSU	2	66.22%	1.32		
CW	14	65.56%	9.18	205,124.23	14,651.73
ICU	5	90.00%	4.50	238,387.61	47,677.52
PEDI	8	60.56%	4.84	94,246.27	11,780.78
CHEMO	4	52.56%	2.10	185,720.58	6,878.54
SF	23	75.56%	17.38		
FIFTH FLOOR	13	42.22%	5.49	121,965.76	9,381.98
MF	12	89.89%	10.79	116,421.86	9,701.82
	average monthly procedure			**Cost per month**	**Cost per procedure**
OR		392.90		266,107.10	677.29
OPEN HEART		10.60		105,334.06	9,937.18
CATH LAB		84.10		44,351.18	527.36
KD		742.44		49,895.08	67.20
ENDOSCOPY		72.44		38,807.29	535.68

A. 9:
Distribution of average consumption of electricity and diesel

Unit	Monthly Consumption	
KD	2.00%	1,095,877.72
Endoscopy	0.25%	136,984.72
administration	0.50%	273,969.43
MF	2.00%	1,095,877.72
First Floor	**4.75%**	**2,602,709.59**
Lab	10.00%	5,479,388.61
Rad	15.00%	8,219,082.92
OR	15.00%	8,219,082.92
Ground Floor	**40.00%**	**21,917,554.45**
ICU	**5.00%**	**2,739,694.31**
ER	**1.00%**	**547,938.86**
Pediatric	0.75%	410,954.15
Chemotherapy	0.25%	136,984.72
SF	2.00%	1,095,877.72
Second Floor	**3.00%**	**1,643,816.58**
HICU	5.00%	2,739,694.31
Open Heart	5.00%	2,739,694.31
Cath Lab	5.00%	2,739,694.31
CW	2.00%	1,095,877.72
Fourth Floor	**17.00%**	**9,314,960.64**
OBS/GYN	1.00%	547,938.86
NICU	3.00%	1,643,816.58
MED/SURG	2.00%	1,095,877.72
Fifth Floor	**6.00%**	**3,287,633.17**
Laundry	**15.00%**	**8,219,082.92**
Dietary	**8.00%**	**4,383,510.89**
Extensions	**0.25%**	**136,984.72**

A. 10:
Summary of depreciation per center

Unit	Yearly depreciation	9 months dep.	Monthly dep.	Unit of measure	LBP / unit of measure
OR	138,313,098.59	103,734,823.94	11,526,091.55	3,552.00	29,204.62
HICU	51,468,796.61	38,601,597.46	4,289,066.38	719.00	53,687.90
CW	51,468,796.61	38,601,597.46	4,289,066.38	2,487.68	15,517.11
OPEN HEART	34,842,414.00	26,131,810.50	2,903,534.50	93.00	280,987.21
CATH LAB	90,186,711.05	67,640,033.29	7,515,559.25	753.00	89,827.40
ER	9,958,778.05	7,469,083.54	829,898.17		
ICU	24,685,645.69	18,514,234.26	2,057,137.14	1,245.00	14,870.87
FF	4,863,192.46	3,647,394.34	405,266.04	2,970.50	1,227.87
Endoscopy	31,082,716.83	23,312,037.62	2,590,226.40	652.00	35,754.66
KD	40,300,626.34	30,225,469.76	3,358,385.53	6,682.00	4,523.42
LAB	34,062,931.09	25,547,198.32	2,838,577.59	10,307,213.00	2.48
RAD	230,856,275.22	173,142,206.42	19,238,022.94	5,424,180.00	31.92
SF	23,584,119.04	17,688,089.28	1,965,343.25	8,780.62	2,014.45
ICN	59,677,099.31	44,757,824.48	4,973,091.61	1,415.00	31,630.97
MED/SURG	39,281,839.98	29,461,379.99	3,273,486.67	1,492.04	19,745.70
OBS/GYN	45,598,367.98	34,198,775.98	3,799,864.00	1,153.97	29,635.76

A. 11: Example of service department cost allocation

	Monthly		
labor cost	2,639,710.33		
Maintenance cost	1,529,484.38		
Stationary cost	4,631.79		
Depreciation cost	227,402.72		
Service departments cost allocation	173,479.60		
Total	**LBP 4,574,709**		
ALLOCATION BASE		**# of users/peripherals**	
Total (Monthly) allocated			**4,574,709**

Unit	#	%	Total (Monthly) allocated
ACCTG	16	19.05%	871,373.11
Admission	3	3.57%	163,382.46
BIOMEDIC	2	2.38%	108,921.64
CATH	1	1.19%	54,460.82
CH	1	1.19%	54,460.82
CW	4	4.76%	217,843.28
DIETARY	1	1.19%	54,460.82
ENDOSCOPY	1	1.19%	54,460.82
ER	3	3.57%	163,382.46
FF	2	2.38%	108,921.64
HICU	2	2.38%	108,921.64
ICN	2	2.38%	108,921.64
ICU	2	2.38%	108,921.64
INFECTION CONTROL	2	2.38%	108,921.64
KD	1	1.19%	54,460.82
Kitchen	3	3.57%	163,382.46
LAB	8	9.52%	435,686.56
MAintenAnce	1	1.19%	54,460.82
MF	1	1.19%	54,460.82
MRD	4	4.76%	217,843.28
OBS	1	1.19%	54,460.82
OPEN HEART	2	2.38%	108,921.64
OR	4	4.76%	217,843.28
PEDI	1	1.19%	54,460.82
PhArmAcy	5	5.95%	272,304.10
RAD	8	9.52%	435,686.56
SF	3	3.57%	163,382.46
TOTAL	**84.00**	**100.00%**	**4,574,708.83**

Pharmacy costs allocation

	% of total quantity dispensed	Allocated to daily dispensing	Monthly Patient days/ Procedures	% of Total monthly cost	Allocated to daily	Daily Patient days/ Procedures	Allocated to one patient days /	Allocated to one patient	Allocated to one patient days / clinical*	Allocat patient
CW	12.10%	12,109.62	286.44	1.84%	1,912.42	9.55	1,268.30	200.30	1,781.96	3
CCU	6.84%	6,850.69	79.33	0.73%	763.50	2.64	2,590.60	288.72	1,781.96	4
CH	1.40%	1,398.87	65.90	2.55%	2,654.75	2.20	636.80	1,208.51	1,781.96	3
CSU	4.57%	4,577.92	79.33	3.20%	3,326.58	2.64	1,731.15	1,257.95	1,781.96	4
Delivery	0.78%	780.34	78.00	31.96%	33,269.88	2.60	300.13	12,796.11	1,781.96	14
ICU	10.35%	10,357.70	139.83	1.18%	1,226.94	4.66	2,222.15	263.23	1,781.96	4
MED-SURG	6.31%	6,319.26	162.56	10.64%	11,078.63	5.42	1,166.18	2,044.49	1,781.96	4
MF	13.79%	13,806.88	326.33	0.20%	210.59	10.88	1,269.27	19.36	1,781.96	3
NICU	1.10%	1,100.53	72.67	0.08%	81.66	2.42	454.35	33.71	1,781.96	2
Nursery	0.38%	384.32	79.56	9.58%	9,970.20	2.65	144.93	3,759.74	1,781.96	5
OBS/GYN	2.74%	2,744.19	124.40	3.51%	3,658.13	4.15	661.80	882.21	1,781.96	3
Pediatrics	1.77%	1,774.08	149.73	0.04%	39.79	4.99	355.45	7.97	1,781.96	2
SDS	0.26%	262.66	243.21	5.67%	5,898.59	8.11	32.40	727.60	1,781.96	2
SF	19.60%	19,616.28	520.33	6.53%	6,797.19	17.34	1,130.99	391.90	1,781.96	3
OR	8.99%	9,000.04	382.50	0.68%	709.85	14.71	611.77	48.25	0.00	
Endoscopy	0.12%	122.72	71.33	0.15%	160.97	2.74	44.73	58.67	0.00	
KD	2.38%	2,384.85	730.50	1.24%	1,285.95	28.10	84.88	45.77	0.00	
Cath Lab	0.76%	760.24	90.00	6.83%	7,109.44	3.46	219.62	2,053.84	0.00	2
Cardio-thorac	1.75%	1,750.10	10.50	1.50%	1,559.20	1.00	1,750.10	1,559.20	0.00	3
Radiology	0.17%	171.33		0.04%	38.02					
Laboratory	0.20%	200.24		0.06%	62.54					
ER	3.63%	3,633.80		11.81%	12,296.87					
Total	100.00%	100,106.67	2,407.63	100.00%	104,111.70					

A. 12: Cost Models

	MF		SF		OBS	Pediatrics	CH	MED/SURG	CW	Nursery
Cost per patient day	**Post ICU**	**Medical**	**Surgical**	**Medical**	**Ward**	**Ward**	**Ward**	**Ward**	**Ward**	**Ward**
Direct cost										
Labor cost	43,008.67	43,008.67	40,851.00	40,851.00	64,064.87	59,378.05	55,998.67	66,682.91	46,038.67	69,084.63
MS (including medical gases) cost	17,782.24	11,517.12	19,359.38	17,252.55	24,220.23	10,795.89	14,179.94	15,316.72	12,929.82	23,314.68
Dietary cost**	21,760.02	21,760.02	21,760.02	21,760.02	21,760.02	27,618.42	13,670.42	21,760.02	21,760.02	0.00
Direct cost	**82,550.92**	**76,285.81**	**81,970.41**	**79,863.57**	**110,045.12**	**97,792.35**	**83,849.03**	**103,759.64**	**80,728.50**	**92,399.31**
Overhead cost										
Cleaning cost	6,656.08	6,656.08	6,112.50	6,112.50	7,897.90	6,112.50	6,112.50	7,897.90	7,353.66	7,897.90
Stationary cost	1,928.88	1,928.88	2,612.49	2,612.49	2,399.44	685.47	2,177.02	3,940.12	2,509.04	1,535.37
WM cost	724.51	724.51	724.51	724.51	724.51	724.51	724.51	724.51	724.51	724.51
Laundry cost **	3,568.05	2,129.63	6,091.11	1,775.84	11,496.25	1,438.42	1,981.86	4,632.98	4,719.77	1,917.90
Maintenance cost***	865.21	865.21	383.81	383.81	1,561.86	536.75	0.00	5,597.65	3,816.74	10.30
Electricity, diesel, & fuel	3,320.28	3,320.28	1,434.98	1,434.98	2,136.73	2,791.62	2,116.36	6,610.35	3,964.70	9,447.22
Overhead cost	**17,063.02**	**15,624.59**	**17,359.40**	**13,044.13**	**26,216.69**	**12,289.28**	**13,112.24**	**29,403.50**	**23,088.41**	**21,533.20**
Direct + Overhead	*99,613.94*	*91,910.40*	*99,329.81*	*92,907.70*	*136,261.81*	*110,081.63*	*96,961.27*	*133,163.14*	*103,816.91*	*113,932.51*
Depreciation cost										
Depreciation cost	3,320.28	3,320.28	2,187.47	2,187.47	14,817.88	1,335.06	1,518.19	19,745.70	15,517.11	28,580.99
Depreciation cost	**3,320.28**	**3,320.28**	**2,187.47**	**2,187.47**	**14,817.88**	**1,335.06**	**1,518.19**	**19,745.70**	**15,517.11**	**28,580.99**
Direct + Overhead+Depreciation	*102,934.22*	*95,230.68*	*101,517.28*	*95,095.17*	*151,079.69*	*111,416.69*	*98,479.46*	*152,908.85*	*119,334.02*	*142,513.50*
Indirect cost										
Indirect cost allocation	9,178.37	9,178.37	9,832.12	9,832.12	24,503.14	13,936.62	8,464.57	19,423.34	14,900.27	48,392.60
Service departments cost allocation	40,471.98	40,471.98	30,323.63	30,323.63	55,432.17	61,919.47	93,204.72	87,668.60	52,393.80	31,669.61
Indirect cost	**49,650.35**	**49,650.35**	**40,155.75**	**40,155.75**	**79,935.31**	**75,856.09**	**101,669.29**	**107,091.93**	**67,294.07**	**80,062.21**
Total average cost per patient day	**LBP 152,584.58**	**LBP 144,881.03**	**LBP 141,673.03**	**LBP 135,250.92**	**LBP 231,015.00**	**LBP 187,272.78**	**LBP 200,148.75**	**LBP 260,000.78**	**LBP 186,628.09**	**LBP 222,575.71**
	$101.22	**$96.11**	**$93.98**	**$89.72**	**$153.24**	**$124.23**	**$132.77**	**$172.47**	**$123.80**	**$147.65**
	LBP 182,161.66									
	$120.84									

*** only contractual maintenance, the ordinary is included in the service depts cost allocation category

Cost per patient day	ICU		HICU			ICN
	TYPE I-III	TYPE IV-V	TYPE I-III	TYPE IV-V	CSU	
Direct cost						
Labor cost	150,039.48	150,039.48	133,188.29	133,188.29	160,857.69	80,597.27
MS (including medical gases) cost	72,785.77	128,685.07	54,067.25	118,545.54	151,107.54	51,251.67
Dietary cost	21,760.02	9,765.41	21,760.02	9,765.41	9,765.41	0.00
Direct cost	**244,585.27**	**288,489.95**	**209,015.56**	**261,499.23**	**321,730.64**	**131,848.94**
Overhead cost						
Cleaning cost	9,576.15	9,576.15	7,353.66	7,353.66	7,353.66	7,897.90
Stationary cost	1,710.32	1,710.32	3,547.43	3,547.43	3,547.43	1,535.37
WM cost	1,086.76	1,086.76	724.51	724.51	724.51	1,086.76
Laundry cost	2,237.58	6,552.86	1,438.42	5,753.70	5,753.70	4,795.32
Maintenance cost	5,112.58	5,112.58	12,444.33	12,444.33	12,444.33	8.32
Electricity, diesel, & fuel	19,805.02	19,805.02	20,576.29	20,576.29	20,576.29	11,704.39
Overhead cost	**39,528.41**	**43,843.68**	**46,084.63**	**50,399.90**	**50,399.90**	**27,028.05**
Direct + Overhead	*284,113.68*	*332,333.64*	*255,100.19*	*311,899.14*	*372,130.54*	*158,877.00*
Depreciation cost						
Depreciation cost	14,870.87	14,870.87	53,687.90	53,687.90	53,687.90	35,409.67
Depreciation cost	**14,870.87**	**14,870.87**	**53,687.90**	**53,687.90**	**53,687.90**	**35,409.67**
Direct + Overhead+Depreciation	*298,984.55*	*347,204.51*	*308,788.08*	*365,587.03*	*425,818.44*	*194,286.67*
Indirect cost						
Indirect cost allocation	31,750.03	31,750.03	58,206.48	58,206.48	58,206.48	48,392.60
Service departments cost allocation	76,841.40	76,841.40	110,226.73	110,226.73	108,573.30	39,303.14
Indirect cost	**108,591.43**	**108,591.43**	**168,433.20**	**168,433.20**	**166,779.77**	**87,695.74**
Total average cost per patient day	**LBP 407,575.98**	**LBP 455,795.94**	**LBP 477,221.29**	**LBP 534,020.24**	**LBP 592,598.21**	**LBP 281,982.41**
	$270.37	**$302.35**	**$316.56**	**$354.24**	**$393.10**	**$187.05**
	LBP 468,653.36					
	$310.88					

	OR			Open Heart			OBS
Cost per OP	**Minor Surgeries**	**Medium Surgeries**	**Major Surgeries**	**Aortic**	**Valve**	**CABG**	**ND**
Direct cost							
Labor cost	102,812.52	102,812.52	102,812.52	878,863.27	878,863.27	878,863.27	38,540.88
MS (including medical gases) cost*	147,453.79	204,401.56	344,560.32	1,606,036.41	2,007,973.59	2,213,204.64	53,403.26
Referral fees				300,000.00	300,001.00	300,002.00	
Direct cost	**250,266.31**	**307,214.08**	**447,372.84**	**2,784,899.68**	**3,186,837.86**	**3,392,069.91**	**91,944.14**
Overhead cost							
Cleaning cost	5,735.68	5,735.68	5,735.68	18,786.78	18,786.78	18,786.78	0.00
Stationary cost	2,417.62	2,417.62	2,417.62	11,304.95	11,304.95	11,304.95	2,399.44
WM cost	1,449.01	1,449.01	1,449.01	1,449.01	1,449.01	1,449.01	1,086.76
Laundry cost	14,469.79	20,223.49	25,977.19	10,068.97	10,068.97	10,068.97	11,496.25
Maintenance cost	13,033.12	13,033.12	13,033.12	59,832.19	59,832.19	59,832.19	0.00
Electricity, diesel, & fuel	20,919.02	20,919.02	20,919.02	258,461.73	258,461.73	258,461.73	10,105.43
Overhead cost	**58,024.24**	**63,777.94**	**69,531.64**	**359,903.63**	**359,903.63**	**359,903.63**	**25,087.88**
Direct + Overhead	*308,290.55*	*370,992.03*	*516,904.48*	*3,144,803.30*	*3,546,741.49*	*3,751,973.54*	*117,032.03*
Depreciation cost							
Depreciation cost	29,335.94	29,335.94	29,335.94	273,918.35	273,918.35	273,918.35	70,079.46
Depreciation cost	**29,335.94**	**29,335.94**	**29,335.94**	**273,918.35**	**273,918.35**	**273,918.35**	**70,079.46**
Direct + Overhead+Depreciation	*337,626.50*	*400,327.97*	*546,240.42*	*3,418,721.65*	*3,820,659.84*	*4,025,891.89*	*187,111.48*
Indirect cost							
Indirect cost allocation	22,443.90	22,443.90	22,443.90	179,152.87	179,152.87	179,152.87	24,503.14
Service departments cost allocation	31,910.90	31,910.90	31,910.90	518,157.21	518,157.21	518,157.21	85,208.39
Indirect cost	**54,354.80**	**54,354.80**	**54,354.80**	**697,310.08**	**697,310.08**	**697,310.08**	**109,711.53**
Total average cost per OP	**LBP 391,981.30**	**LBP 454,682.77**	**LBP 600,595.22**	**LBP 4,116,031.74**	**LBP 4,517,969.92**	**LBP 4,723,201.97**	**LBP 296,823.01**
	$260.02	**$301.61**	**$398.40**	**$2,730.37**	**$2,996.99**	**$3,133.14**	**$196.90**

Cost per L/R	Laboratory	Radiology
Direct cost		
Labor cost	49.53	76.03
MS (including lab out) cost	59.82	1.65
Direct cost	**109.35**	**77.67**
Overhead cost		
Cleaning cost	1.35	2.56
Stationary cost	0.79	1.90
Maintenance cost	1.63	15.36
Electricity, diesel, & fuel	4.78	13.64
Overhead cost	**8.55**	**33.46**
Direct + Overhead	*117.89*	*111.13*
Depreciation cost		
Depreciation cost	2.48	31.92
Depreciation cost	**2.48**	**31.92**
Direct + Overhead+Depreciation	*120.37*	*143.05*
Indirect cost		
Indirect cost allocation	8.98	19.96
Service departments cost allocation	9.67	12.70
Indirect cost	**18.65**	**32.66**
Total average cost per one L/R	**LBP 139.02**	**LBP 175.71**
	$0.09	**$0.12**

Cost per one session/procedure/visit	KD	ER	Endoscopy	Cath Lab			
				Coro	PTCA	Arterio	Pacemaker
Direct cost							
Labor cost	13,398.85	14,034.90	16,979.45	42,169.30	42,169.30	42,169.30	42,169.30
MS (including medical gases) cost	28,546.07	9,685.91	13,222.51	49,985.99	87,711.17	99,055.11	36,493.86
Extra cost (routine tests)	62,161.45						
Referral fees				52,500.00	135,000.00	52,500.00	200,000.00
Dietary cost	6,720.17	0.00	0.00	0.00	0.00	0.00	0.00
Direct cost	**110,826.54**	**23,720.81**	**30,201.97**	**144,655.29**	**264,880.48**	**193,724.41**	**278,663.16**
Overhead cost							
Cleaning cost	2,431.41	1,609.31	0.00	16,096.15	16,096.15	16,096.15	16,096.15
Stationary cost	410.89	292.26	627.46	2,880.03	2,880.03	2,880.03	2,880.03
WM cost	724.51	414.56	724.51	724.51	724.51	724.51	724.51
Laundry cost	1,725.06	1,438.32	1,819.92	6,461.87	6,461.87	6,461.87	6,461.87
Maintenance cost	1,749.26	180.96	0.00	83,041.53	83,041.53	83,041.53	83,041.53
Electricity, diesel, & fuel	1,476.04	444.39	1,890.89	32,576.63	32,576.63	32,576.63	32,576.63
Overhead cost	**8,517.16**	**4,379.82**	**5,062.79**	**141,780.70**	**141,780.70**	**141,780.70**	**141,780.70**
Direct + Overhead	*119,343.70*	*28,100.62*	*35,264.75*	*286,435.99*	*406,661.18*	*335,505.11*	*420,443.86*
Depreciation cost							
Depreciation cost	4,523.42	673.07	35,754.66	89,364.56	89,364.56	89,364.56	89,364.56
Depreciation cost	**4,523.42**	**673.07**	**35,754.66**	**89,364.56**	**89,364.56**	**89,364.56**	**89,364.56**
Direct + Overhead+Depreciation	*123,867.12*	*28,773.70*	*71,019.41*	*375,800.55*	*496,025.73*	*424,869.67*	*509,808.42*
Indirect cost							
Indirect cost allocation	4,136.76	1,950.81	8,614.44	34,704.49	34,704.49	34,704.49	34,704.49
Service departments cost allocation	12,725.71	8,862.37	16,629.84	37,095.52	37,095.52	37,095.52	37,095.52
Indirect cost	**16,862.48**	**10,813.18**	**25,244.28**	**71,800.00**	**71,800.00**	**71,800.00**	**71,800.00**
Total average cost per one procedure/session	**LBP 140,729.59**	**LBP 39,586.88**	**LBP 96,263.69**	**LBP 447,600.55**	**LBP 567,825.73**	**LBP 496,669.67**	**LBP 581,608.42**
	$93.35	**$26.26**	**$63.86**	**$296.92**	**$376.67**	**$329.47**	**$385.81**

A. 13:

Infection Control – Routine tests

Dietary Staff			
20 employees			
every 3 months			
	L	R	
Stool A	12		
Stool culture	90		
Nail culture	90		
PPD	60		
Chest if needed		60	
Total	**252**	**60**	
Total Cost per one employee per one time	$24.20	$6.79	$30.99
Total Cost		**$2,478.93**	
Nurses	15 employees		
every 6 months			
	L		
CBC	45		
Total	**45**		
Total Cost per one employee per one time	$4.32		$4.32
Total Cost		**$129.65**	
Chemotherapy	2 employees		
every 6 months			
	L		
CBC	45		
SGPT	40		
SGOT	40		
Total	**125**		
Total Cost per one employee per one time	$12.00		$12.00
Total Cost		**$48.02**	
Radiology	12 employees		
every 6 months			
	L	R	
CBC	45		
Chest if needed		60	
Total	**45**	**60**	
Total Cost per one employee per one time	$4.32	$6.79	$11.11
Total Cost		**$266.57**	

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