



Medicine Updates
Faculty of medicine
January 2021, volume 4, issue 4

<https://muj.journals.ekb.eg>
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DOI:10.21608/muj.2020. 43124.1030

ISSN : 2682-2741

Submitted: 16/9/2020

Accepted : 16/9/2020

Pages:25- 43

" Establishment of Catheterization unit at Port Said Specialized Private Hospital"

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ABSTRACT

Background: Establishment of cardiac catheterization project is a vision providing excellent health services of high quality using recent technology . Searching in the emergency, intensive care unit, and cardiac clinics, Analysis of our area. T

Informed an increase in coronary heart diseases and its risk factors which is a serious life threatening the health , making the largest contribution to all acute hospitalized cases . It is responsible for 50% of cardiovascular death bed globally. 12.8% of all cause of death and 29.4% in Egypt. 17% of emergency units is chest pain complain. 8-10% of them need catheterization.

The need for cardiac catheterization unit has been increased. Less invasive safe procedures with a high profit . Reducing hospital stay , wait time and list . For Diagnosis and treatment . this project can bridge the gap between what we provide and our view.

Methodology: First: five stages of 6 sigma approach,

Define Study the cardiac catheterization, measure required time , analyze improve , Control . Second: SWOT, TWOS, ETOP Analysis.

A feasibility study, budgeting , legal , environmental , political and social study, catastrophic plan, methods of cost reduction were used .

Conclusion: To establish Cardiac catheter unit, you have more advantages and more services than the competitors. Developing it In future to 4D Robotic . It's a must to plan for the budgeting to measure the expected losses and the expected maximum profits.

Key words: hospital management, coronary heart diseases, cardiac catheterization.

INTRODUCTION

Coronary heart diseases are multifactorial, that represents a serious life threatening the health issue. It makes the largest contribution to all acute hospitalized cases worldwide these days. It is the most common heart diseases killing peoples now a day.

Coronary heart diseases risk factors which is a high incidence in our area is:

Non modifiable as: Age, family history, and genetic factor

Modifiable as: Unhealthy food, physical inactivity, smoking and drug abuse

Diseases as: Diabetes mellitus, hypertension, dyslipidemia, obesity

Cardiac catheterization: A Less invasive safe procedures can be a mixed blessing for patients and hospital. The need for cardiac catheterization unit has been increased for diagnosis or evaluating coronary artery diseases, cardiac problems, to check heart muscle working and to open blocked arteries with balloon or stent, repair heart valve stenosis and also used for pacemaker installation or replacement. (1)

Epidemiology

Coronary heart diseases are a main cause of death till 2020. It is responsible for 50% of cardiovascular death bed globally. 12.8% of all cause of death and 29.4% in Egypt. 17% of emergency units is chest pain complain. 8-10% of them need catheterization (2)

Prevalence risk factors of CHD in Egypt (table 1)

<i>Risks</i>	<i>Total%</i>
<i>Hypertension</i>	<i>39.7</i>
<i>Diabetes mellitus</i>	<i>17</i>
<i>Raised triglyceride</i>	<i>10.2</i>
<i>High cholesterol</i>	<i>36.8</i>
<i>Smoking</i>	<i>24.4</i>
<i>Low activity /obesity</i>	<i>32.1</i>
<i>Having 3 > risk factors from above</i>	<i>51.1</i>

Idea of The Project

A fundamental project which is a Cardiac Catheterization Unit establishment: Cardiac catheterization is a less invasive alternative for coronary artery bypass, grafting for myocardial infarction. It is an important minimally invasive procedure done to get information about the heart, and its blood supply or to provide treatment by insertion of a long, thin, flexible tube (catheter) into blood vessel in groin or arm of the patient guiding its ways to the heart with the aid of a

special X - ray machine to create videos. Valves, coronary arteries, and heart chambers are monitored using special dyes injected through catheter thus, narrowing or blockages of coronary arteries can be identified and treated (as stent) to increase the average of life expectancy also electrophysiology are performed. It can be used to determine the need for heart surgery or other procedures. (3)

Importance of the project: Presence of cardiac catheterization unit can be a mixed blessing for hospitalist and patients which is positive to perform emergency and elective on 24/7 basis as standard of care (4)

Value of the project

Cardiac catheterization has been progressed from function and anatomy for diagnosis and evaluation of heart and its vessels to provide the non- surgical intervention.

Reducing patients waiting times, hospital stay and wait list.

Supplementing patient services and completing the healthcare services in our hospital. For Diagnosis and treat these cases.

Creation of this project in the hospital Increases the operation of laboratory unite, X ray unit and cardiac laboratory, Completing the protocol of treatment in intensive care unit and the service of emergency cardiac cases in emergency unit.

Also, decreasing the cost for patient and increasing hospital profit.

Facing high patient demands in future.

Our Vision : We aspire to be a pioneer in providing excellent health services at the regional level .

Our mission : The hospital is committed to providing an integrated health service oh high quality within the reach of every one taking into account the ethics of profession and the health of society and environment using recent technology with continuous medical education .

Project location: At Port Said Specialized Private Hospital which is located in the Heart of Port Said governorate.

Future view: Changing vision and mission according to the policy and period making us in future treat aortic valve replacement, Renal denervation in persistent hypertension, Repair of patent foramen oval.

Using 4D rotational angiography, reaching to Robotic Cardiac catheter. and artificial intelligence in this field. making an extension in port Fouad and increase number of beds.

Overview of Port Said Specialized Private Hospital

Which is located in the middle of the city, surrounded by two main streets easy to reach, on area of 2500 meter square It has two building, 8 floors and 78 beds and is providing health emergency and care units

Methodology

To identify the need for this project, the following methods are going to be done:

First: five stages of 6 sigma approach:

Define: Study the cardiac catheterization

Measure: Develop process map, conduct time study, required three months.

Analyze: Data collection statistically analyzed.

Improve: Identify potential causes of delay.

Control: Improvement using managerial process of analysis, planning and feedback by meeting, advices, notes, continually gathering information about other hospitals and customers market.

Second: SWOT, TWOS, ETOP Analysis

SWOT analysis for the project table (2)

	Favorable	Unfavorable
	Strengths	Weaknesses
Internal factors	1)The design of the building gives us a chance for development. 2)A leadership team that takes a crucial role in the program of development. 3)Location of the hospital in the heart of governorate with easy transportation. 4)Having emergency unit, Intensive care unit, cardiac laboratory, cardiac outpatient clinic and inpatient beds. 5)High patient satisfaction feedbacks about the hospital, facilitate marketing. 6)Extremely strong team with excellent emergency skills. evidence-based Procedures, polices 7)Cutting edge equipment with high	1)A high number of staff members are registries travelers . 2)High cost. High salaries. 3)Poor advertising and weak marketing team. 4)lack of experience in health care providers in the area. 5)The medical services needs a cardiac catheter unit. 6)Increase transferring or discharging coronary heart patient to catheterize. 7)lack of a clear incentive and bonus mechanism.

	<p>level of technology.</p> <p>8) Paperless.</p> <p>9) Availability of medical assistant services and proper housing.</p> <p>10) having a contract with many companies.</p> <p>11) The first private hospital to obtain accreditation in the government.</p> <p>12) A financial support through the charity.</p>	
	Opportunities	Threats
External factors	<p>1) Progressing the services of catheter.</p> <p>2) Enable to focus on development.</p> <p>3) Good media relation Better care delivery</p> <p>5) Increase medical insurance Co.</p> <p>6) Increase the prevalence of cardiac risk factor and cardiac patients in this area.</p> <p>7) Egyptian policy encourages investment in the health field</p>	<p>1) Competitors.</p> <p>2) Need more contracts with a lot of medical insurance .</p> <p>3) Political and economic instability .</p> <p>4) Any accreditation need high budget</p> <p>5) Wideness of marketing media which need professional team.</p> <p>6) High prices for maintenance and spare parts.</p> <p>7) Increase water ,electricity and phone costs</p> <p>8) Increase the level of salaries of staff</p>

The strategy to turn the threats and weakness to strength and opportunities (TWOS)

1. Increase the contract with medical centers and clinics to use our medical services.
2. Complete health care service and decreasing patient complains.
3. Speed in performance and accuracy of results. decrease the wait time and list
- 4- More training for health care providers.
- 5- Depend on Variety of medical school from different universities
- 6- Establishment of Cardiac Catheterization unit and increase number of beds
- 7-Support the marketing unit by professional staff.
- 8-Proper communication with client's patients' governors
- 9-Look for Clients and patient's demands.
- 10- Accreditation is mandatory facilitating contracts with the comprehensive health insurance authority.
- 11- Facilitate staff and patients transport.

Human Resource

Human resources in study (table 3)

Title	Number	Experience	Qualification	Courses
Consultant	3	3-5 years	Interventional physician cardiologist	Basic & advanced life support. Arrest and Echo dealing
Specialists	2	2-3 years	(Master degree of cardiology)	
Nurses	3	2- 3 years	Bachelors of nursing degree	Basic life support.
Scrub Monitor Manger			Heart institute experience	Infection control Patient safety
Ct scan facility radiology technician and catheter	2	3years	High school technique in radiology	Basic life support. Infection control Patient safety
Secretary	1	2years	College of English commerce	Computer science Language
House keeper	2	1 year	Secondary school	Infection & fire control
Unit manger	1	3 years	physician of cardiology)	Hospital management diploma.

The Produced Service

Service time for each customer: Examination, counselling investigations 20-30 minutes. Transfer to the unit 5 -10 minutes

Procedures: Diagnostic 30 minutes – intervention 30 -60 minutes

Hospital stay: 4-6 hours

Amount of service: Diagnosis or evaluating vessels and heart

Treatment Balloon or stent repair stenosis pacemaker installation or replacement, ablation

Other benefits of the unit: Neurosurgical services. Vascular surgery catheters and filters. OBSGYN Placenta Previa also and fibroid uterus. Oncology

Costs of Drugs and medical supplies: 1150000 LE

Amount of service estimated: Nearly 222 cases annually

Marketing and Sales Plan

Customers: from intensive care and emergency units in the hospital.

Patients referred from cardiologists private clinics, contracting deals patients, who is referred from comprehensive health insurance.

Market segmentation: private, comprehensive health insurance and Governmental. Age group, risk factors, according to the areas and maneuvers.

Market strategy: focus about high quality, align with physician, health association programs wearing risk factors. Offers & pones services all over the day. (5)

Reaching to customer through: media, sponsors, banners, hand out, TV and seminars.

The sales strategy: Excellent hotel service, Post treatment follow up service, the presence of supportive services (radiology - laboratory – pharmacy and cardiac lab), Use style of package to decrease cost.

Competitors: include governmental, private and military hospitals

Customer prefers our service: The location is easy to reach. Excellence housing services. Patients right and privacy, Professional health care providers, with high quality and infection control, Patient safety and health standers policies. No waiting list and no waste of time. Reducing the financial cost with facilitating the payment.

The cost of marketing ads and social media is ~ 40000 L. E

Pricing the project service: Unit fees/L. E:

Diagnostic cardiac catheterization 1000 L. E

Cardiac catheterization and stent fitting 9000 L. E

Additional stent fitting 4000 L. E

Balloon expansion 7000 L. E

Temporary cardiac regulator 1800 L. E

Permanent cardiac regulator 5000 L.E

Expected number of cases 692 cases per year

Expected Annual revenues ~ 7460000 L.E

The Legal and Obligatory Study

The legal study: Medical and Engineering Authority, laws governing Arab Republic of Egypt. Civil protection accreditation for hospital safety. Occupational safety and health. Centers for disease control & prevention. Also, subjected to the standards and policies of the ministry of health and population. Subject to policies, standards and supervision of Egyptian Atomic Energy Authority. (6)

The political study: Political governing currently supports investments in health projects.

The environmental study: Contracting to dispose of medical and non-medical waste in an environmentally friendly manner by 20LE per kilogram. Environmental protection agency. Yellow box for sharp instruments fixed to wall, cannot emptied or reused. Red bag with biohazard label, blue bag for non-medical waste. Hand wash by soap and water or alcohol 70%. (7)

The social study: Study the extent community's need for the service and improving the level of health in Port Said.

Catastrophe plan: Automatic fire detection and resistance system. A fire plan and evacuation plan total or partial in fire or natural disaster, using fire extinguisher: pull the pin, aim to the base of fire squeeze handle, sweep nozzle and stand away from fire by 6-10 feet (PASS). Evacuation: rescue, alarm, contain by closing doors and windows, evacuation. Drill 4 times/year. Financing catastrophic management & crisis ~ 179725.46LE. Chemical spill handling a plan for waste.

So, accidents can be divided up to accident related to physical environmental and equipment and accident related to patient care. which in hospital is fire accident, chemical accident, hospital wastes and environmental. So, achieving quality outcomes is a group process. (8)

Security: a well-trained highly qualified person for security.

Covering the hospital with surveillance cameras.

Safety & Infection control plan: using personal protection equipment against covid 19, hepatitis B & C, and immune deficiency virus, boron jackets as, radiation protection. (9)

Transportation: location of hospital – parking – buss – ambulance.

Training: We have a contentious medical education: Basic life support, Advanced life support, civil fire protection .Costing annually about 18000 L.E , BLS 300 LE, ALS 1500LE, Civil protection and fire course 300LE.

Financial Study Budgeting the project

Financing structure (table 4)

Statement	Amount LE
The capital (7 investors)	14000000
Suppliers and facilities	3000000
Total	17000000

FIXED ASSETS (table 5)

Capital	Fixed assets	Money capital
17000000LE	13314100LE	3685900LE

Current assets (table 6)

Statement	Value/LE
Suppliers and facilities	3000000
Stocks	1850000
Banking	1000000
Total	5850000

Fixed assets	Value LE
Building	3000000
Medical tools and supplies	10191000
Furniture	104600
Electric and computer devices	18500
Total/LE	13314100

The capital = fixed asset + current asset = 13314100 + 5850000 = 19164100 LE
Money capital / capital = 3685900 / 19164100 = 19.2 % (more than 2%) Ability to meet obligation without selling any of current assets or asking for loans.

Current assets / capital = 5850000 / 19164100 = 30.5 % (more than 30% which is more than finance obligation) Ability to meet obligation

The money capital = 3685900 LE

Expenses (Cost)

Table: (A): Medical tools and supplies

Tools	price/LE
Cardiac angiogram X-ray Phillips	10000000
DC Shock	115000
Monitor	76000
Total	10191000

Table: (B) Furniture medical and non-medical

Tools	Number	Unit price/LE	Total price/ LE
Electric bed 3 movement	2	25000	50000
Crash cart	1	10000	10000
Sterilization pelvis	1	7000	7000
Crocodile table	1	800	800
Stainless steel cupboard	1	2000	2000
Lead operon	5	2000	10000
Desk	1	3000	3000
Entrain	1	6000	6000
Corner bed	1	8000	8000
Medical chair	3	600	1800
Reception chairs	8	750	6000
Total			104600

Table: (C)Electric devices and computer

Devices	No:	Unit price/LE	Total price/LE
Television	2	4000	8000
Computer	1	7000	7000
Printer	1	2000	2000
Telephone set	3	500	1500
Total			18500

Table (D) Current cost

Cost	Total / LE
Maintenance of building and machines	250000
Drugs and medical supplies	1150000
Training	15000
Electricity supply	100000
Water supply	25000
Telephone and net	20000
Gases	30000
Cost of marketing	40000
Patients and worker's food	150000
Publications and writing tools	30000
Toiletries	15000
Total / LE	1735000

Table (E) Doctor fees

Fees	Unit fees / LE	Total / LE
Diagnostic cardiac catheterization	1000	370000
cardiac catheterization and stent fitting	9000	1350000
Additional stent fitting	4000	240000
Balloon expansion	7000	525000
Temporary cardiac regulator	1800	45000
Permanent cardiac regulator	5000	60000
Total / LE	27800	2590000

Table (F) Salaries / year

Categories	number	Unit LE / month	Total LE/ year
Secretary	1	2400	28800
Nurses	3	2500	90000
House keeper	2	1800	34200
Technicians	2	2500	60000
Resident doctor fees	2	12000	288000
Unit manager	1	15000	180000
Social insurance			40000
Rewards			25000
Doctors' fees			2590000
Total	11		3336000

Depreciation schedule / year (table 7)

Statement	Value LE	%of depreciation/year	Value LE
Medical tools and supplies	10191000	15%	1528650
Electric devices and computer	18500	25%	4625
Furniture	104600	5%	5230
Building unit	3000000	2%	60000
Total			1598505

Fixed cost = 3336000 LE. Current cost = 1735000 LE.

Total cost = fixed cost + current cost = 3336000 + 1735000 = 5071000 LE

Total cost / unit service = 5071000 / 692 = 7328 LE

Fixed cost / unit service = 3336000 / 692 = 4820.8 LE

Current cost / unit service = 1735000 / 692 = 2507.25 LE

Method of cost reduction: Change the electric light system to lead its cost is nearly 1000 LE., to reduce electric bill to 60000LE/year

Rationing water use depending on sensitive facets at accost 5000LE reducing water bill to 10000LE/ year. Also, telephone depending on pager and cell phone, to reach with the bell to 10000 LE

Hire a marketing professional part time opposite to 10000LE, and another 15000 to media reaching annually to 25000LE

Changing the worker's meal system to pay 20 LE for each one

Adding and activating the role of the cafeteria to win another 12000 LE. Rationalize paper consumption and rely on computer system, it will reach with this band to 10000LE Depend on well trained doctors to operate with the needed cost

The expected Annual revenues (table 8)

Statement	No: of cases	Unit price	Total
Diagnostic cardiac catheterization	370	3000	1110000
cardiac catheterization and stent fitting	150	25000	3750000
Additional stent fitting	60	15000	900000
Balloon expansion	75	17000	1275000
Temporary cardiac regulator	25	5000	125000
Permanent cardiac regulator	12	25000	300000
Total	692	90000	7460000

The expected profits

The expected profits = annual revenues – (total cost +depreciation schedule)

After the first year: Add 20% for revenues, And 10% for salaries and current cost.

The general income statement for the fiscal year 2021(table 9)

Value	Expenses	Value	Revenues
5071000	expenses / year	7460000	Annual revenue
1598505	Depreciation schedule / year		
6669505	Total		
790495	Profit		

The profit = revenue – cost (table 10)

Year	Revenue	Cost	Profit	Profit after tax (80% P)
2021	7460000	6669505	790495	632396
2022	8952000	7176605	1775395	1420316
2023	10742400	7734415	3007985	3685192
2024	12890880	8348006	4542874	3634299.2
2025	15469056	9022956.10	6446099.9	5156879.9
2026	18562867.2	9765401.21	8797466	7037972.8
Mean	12346200.53	8119481.3	3182369.1	3594509.3

Net profit means: 3594509.3 LE

Profit (mean) / revenues (mean) = $5825224.15 / 12346200.53 = 0.47$ indicate good cost management.

Profit (mean) / capital = $5825224.15 / 19164100 = 0.30$

indicate efficiency of using resources

Profit (mean) / fixed asset = $5825224.15 / 13314100 = 0.347$ indicate efficiency of using fixed assets

Profit (mean) / current assets = $5825224.15 / 5850000 = 0.995$ indicate efficiency of using current assets without selling, shares, and bonds.

Profit (mean) / money capital = $5825224.15 / 3685900 = 1.58$ indicate efficiency of allocating money to cover expenses and to maximizing profit without asking for loans.

Statement of cash flow LE: Revenues - (salaries + current cost) LE (table 11)

Year	Revenue	Cost	Balance +/-
2021	7460000	5071000	+2389000
2022	8952000	5578100	+3373900
2023	10742400	6135910	+4606490
2024	12890880	6749501	+6141379
2025	15469056	7424451.1	+8044604.9
2026	18562867.2	8166896.21	+10395970.99
Mean	12346200.53	6520976.38	+5825224.15

Calculate the payback period (table 12)

Year	Profit	Remaining amount	Payback year
2020	17000000	0	Zero
2021	17000000	790495	First rear
2022	16209505	1775395	Second year
2023	14434110	3007985	Third year
2024	11429125	4542874	Fourth year
2025	6886251	6446099.9	Fifth year
2026	440151.1	8797465.99	Six year

Net profit distribution annually (table 13)

Distribution items	%	Value /LE
Reserve	20%	718901.86
Investment	20%	718901.86
Distribution (owner, shares workers)	40%	1437803.7
Pessimistic assessment	15%	539176,39
CRISES	5%	179725.46

Conclusion

From this research, it is concluded the following:

Cardiac Catheterization Unit Establishment at Port Said Private Hospital is a fundamental project for establishing a Cardiac catheterization unit which can be a mixed blessing for hospital and patients by performing the procedures for these categories of patients, reducing the burden on waiting lists of cardiac catheterization procedures at our area, and reduction of patients waiting times and hospital stay. Supplementing patient services and completing the healthcare services in our hospital. Adding this project to develop the hospital financial resources and revenue and facing high patient demand in future. The vision became clear through estimated cost for cardiac catheterization angiography X-ray machine (Philips Assertion 3M 12), medical and non-medical furniture, medical tools & supplies and the building. Training staff BLS, ALS and civil protection fire course.

Proper marketing to define the customers who are Emergency cardiac patients, intensive care, cardiology clinic, private clinics, contracting deals patients and who is referred from comprehensive health insurance.

Define competitors including the governmental, private and military hospitals. The customer prefers the service for excellence hotel services, observing the patients right and privacy, depending on a professional staff, implement infection control, quality control and occupational safety and health standers and policies. A strategic study for the number of patients, who will be benefited from the service annually. Targeting the customer through all types of media, banners meetings and handout. Focus about Excellent hotel service, Post-treatment follow-up service use style of package to decrease cost.

The legal study by the Legal Affairs Department in cooperation with the Medical and Engineering Authority. A special project subject to laws. Civil protection accreditation for hospital safety conformity. The political study of the

conditions allows the establishment of the project, because political sovereignty currently supports investments and health projects. The environmental study: Contracting with specialized companies to dispose of medical and non-medical waste in an environmentally friendly manner. The social study: Study the extent of the community's need for the service and the extent of the service's impact on improving the level of health in Port Said. The catastrophe plan: Evacuation plan in the event of a natural disaster and fire. A plan to deal with power cuts, Chemical spill handling plan, a plan for dealing with medical and non-medical waste, Infection control plan and for medication errors. Security, safety and fire plan: The hospital has a contract with a trained security company. We have our specific fire safety plan in the event of a fire emergency and a plan to evacuate the hospital with training about PASS to deal with extinguisher and RACE for evacuation.

Financial study: targeting 692 cases annually, processing a feasibility study and its measurements as $\text{Money capital} / \text{capital} = \text{Ability to meet obligation}$ without selling any of current assets or asking for loans (more than 2%). $\text{Current assets} / \text{capital} = \text{Ability to meet obligation} = (\text{more than } 30\% \text{ which is more than finance obligation})$. Total cost = fixed cost + current cost. Total cost / unit service. reaching to proper net profit, customer satisfaction gets back its value of the project in the 6th year. In order to reduce cost, we can change light to lead, using sensitive facet using pager instead of telephone, making hospital paperless and high-quality. During the plan we are putting in our mind the risk management using 15% of net profit to face the risks. also, crisis and catastrophe prediction Our project will be valid for 20 years so, we did not forget the development plan by upgrading machine to 4 D, robotic catheter machine, increasing number of bed and extend our services to Port Fouad.

Recommendations

To establish or develop any project, (Advanced Hospital Management) book by Prof. Dr. / HEBA YOUSSEF is highly recommended.

Strategy starts from Who are we? What are our services? then, where will we be in future? The competitors and my ranking are among them.

Through The gap between the present and the visionary plan, data can be collected, SWOT analysis, brain storming and arrange the priorities to reach our goal.

Proper & modern unconventional marketing is essentials.

A Feasibility study determine the volume of revenue and payback the financial funds.

Legality of the project. Safety and catastrophic plan are key performance indicators.

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