

A Cost-Minimization Analysis of Day-Care Versus in-Patient Surgery for Five Most Common General Surgical Procedures

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Abstract

Objective: This study aimed to compare costs of Day-care versus in-patient surgery for five *most common* general surgical procedures in a general hospital in Iran.

Methods: In this retrospective study the records of all patients who underwent five *most common general surgical operations* (including Hernia, Hemorrhoid, Fistula, Pilonidal Sinus and Varicocele) between March 2011 and March 2013 were reviewed. The data about costs of these *procedures* was collected by a checklist, designed by the authors, one year before and one year after establishing the Day-Care ward in the hospital. The checklist was designed on the basis of 14 financial items related to surgical patients. All costs were measured from the provider's perspective.

Results: The results of this study showed that after implementing day-care surgery ward, inpatient care costs, such as medicine/drugs, physician visits, medical consumable, personnel and hotel, reduced significantly per each procedure. However, the costs directly associated with each surgery, such as drugs and consumable, surgeon's wage and anesthesia costs, between these two periods was not significantly different. The highest amount of savings was related to the personnel costs, with 997,000 IRR reductions. On average, total cost of each procedure was reduced by 2,031,358 IRR after implementation of day-care ward.

Conclusion: The findings from this study demonstrate that day-care surgery is a cost saving method compared to in-patient surgery for five most common general surgical procedures. It is recommended that hospital managers consider establishing day-care ward and conducting surgical procedures, in particular elective general surgical procedures, in this regimen, to decrease hospital costs and to make hospital beds free, for other patients who are more in need of specialized medical and nursing skills.

Key words: Day-Care Surgery, Inpatient Surgery, Cost-saving, Cost-Minimization, Cost Analysis

Introduction

Numerous attempts have been made to deal with the scarcity of resources in health care sector. One of these attempts has been the day-care surgery approach [1]. With the incremental financial and bed pressures in the health care systems, there is a drive toward increasing day-care surgery provision. Day-care surgery is being explored as a means of improving patient experience as well as efficiency in terms of cost savings [2].

There is a wide range of surgical operations that can be carried out as day-care surgery. In several developed countries a major proportion of elective surgeries have

been conducted in day-care surgery method. For example, in 2002 the Department of Health in England launched a strategy for day-surgery, recommending that 75% of elective admissions should be day cases [3]. Moreover, there has been a rapid increase in surgical day-care in a number of provinces in Canada. In British Columbia in particular, this form of surgery is given for approximately one third of all pediatric surgeries [4]. Some clinical trials and numbers of non-randomized studies, have demonstrated that day-care surgery is a safe approach [5] and outcomes and post operative care are, at least as good as for the same procedures per-

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formed on inpatient cases. Further, studies have found that re-admission rates are not significantly different between these two methods [2].

Advantages of day-care surgery compared to inpatient surgery are well-documented in the literature [4-13]. Compared to inpatient surgery, day care clinic requires fewer staff, is less capital intensive, is more attractive to nursing staff, causes less anxiety for patients and their family, reduces surgical waiting list and reduces the risk of infection considerably [4-7].

Studies have shown that the use of ambulatory health care facilities and same-day surgery programs to treat patients on an outpatient basis have, indeed, helped to significantly reduce health care costs [8-12, 14-17]. Studies have demonstrated that hospital costs are from 11% to 70% lower for day-care surgery than for the same procedures on an inpatient basis [5]. There has been little research conducted on this topic in Iran [18, 19].

In Iran although, conducting surgeries in day-care method has started formally from 1997 and many outpatient surgery centers has been established since then, there is limited evidence about quality and efficiency of this plan [18, 19]. The current study aims to compare the costs of 5 most common general surgical procedures performed in a day-care surgery method versus an inpatient surgery ward in a general hospital in Iran.

Material and Methods

This study is a retrospective cost analysis of five general surgeries with high frequency in hospital affiliated to the Social Security organization. The study population included all uncomplicated patients who underwent the same procedures in the day-care ward, between March 2012 and March 2013 (after the launching the day-care surgery ward). All the costs were measured from the point of view of the service provider. Only direct costs, both medical and non-medical, were measured in this study. Direct medical costs were included all medical resources (e.g., tests, drugs, supplies, healthcare personnel, operation costs etc.) that were consumed or performing the procedures and direct non-medical costs were included overhead and support department costs that were allocated according to the size of the ward and the number of patients admitted to the ward. Direct medical costs were extracted from the hospital bills using a checklist designed for this purpose. The checklist contained 14 cost items including the cost of operating room drugs, operating room consumable supplies, inpatient drugs, inpatient medical consumables, general consumables, physicians 'fees, surgeons' fees, anesthesiologist fees, operating room expenses, personnel costs, support departments' personnel costs (e.g., reception, accounting, logistics, management etc.), food costs, laundry costs, and general administrative and overhead costs. Drugs and consumables, the first five items of checklist, were extracted from the hospital bill. Physicians, surgeons and anesthesiologists' fees were calculated based on the Ministry of Health tariffs in 2011. Personnel costs of operating room, inpatient personnel costs and support departments' personnel costs were calculated based on their annual pay slips, obtained from the hospital's ac-

counting department. Food and laundry costs were calculated based on the cost of a portion of food and one kilograms of washed clothes for each patient. Water, electricity, fuel and maintenance costs were estimated, as general administration and overhead costs, obtained from the hospital's accounting department. All costs were calculated based on annual prices of 2011.

Results

Medical records of 2470 patients underwent a surgical procedure during 2011 and 2012 were reviewed and five general procedures with high proportion were selected. These procedures were consisted 25% of all surgical cases. Of 425 patients included in this study, 234 inpatient surgery cases and 191 day care surgery cases (Table 1). The majority of cases were male, except for Pilonidal Sinus, and aged between 10 and 78 years old (Table 2). Table 3 compares average costs per each procedure for both inpatient and day care surgery methods and the amount of cost savings made by each surgical procedure in day care surgery method compared to inpatient surgery.

The maximum cost saving was related to fistula surgeries with 2,106,103 IRR (29.7%) and the minimum cost saving was belonged to hemorrhoid surgeries by 1,967,620 IRR (28.2%).

Table 4 shows the average cost savings made based on the main cost items. The highest amount of saving was related to the personnel costs, with 997,000 IRR reductions and the lowest amount of savings was associated with inpatient general consumables with 1,650 IRR reduction. Average cost saving for all procedure in day care method compared to inpatient surgery was 2,031,358 IRR.

Discussion

The findings from this study demonstrate that day-care surgery is a cost saving method compared to in-patient surgery for five most common general surgical procedures. The results showed that there were significant reductions in costs of inpatient physicians' visits, inpatient drugs and other medical consumables and general inpatient consumables for patients underwent surgery in day-care surgery compared to those in inpatient-surgery.

Table 1. The number of surgical cases included in the study

Surgical Procedure	Inpatient surgery	Day-care surgery
Fistula	36	32
Hemorrhoid	51	43
Hernia	65	53
Pilonidal Sinus	39	29
Varicocele	43	34
Total	234	191

Table 2. Demographic characteristics of included cases

Surgical procedures	Female	Male	Age
Fistula	42%	58%	12-78
Hemorrhoid	47%	53%	11-73
Hernia	46%	54%	14 - 78
Pilonidal Sinus	52%	48%	17 - 69
Varicocele	0%	100%	10 - 59

Table 3: Comparison of costs of reviewed surgeries and resulted cost savings in two under studied methods based on surgical differentiation

Surgical procedure	Inpatient	Day Care	Cost saving(IRR)	Cost saving(%)
Fistula	7,159,904	5,053,801	2,106,103	29.4
Hemorrhoid	6,981,511	5,013,891	1,967,620	28.2
Hernia	7,091,680	5,066,390	2,025,290	28.6
Pilonidal Sinus	6,932,875	4,915,390	2,017,485	29.1
Varicocele	6,868,380	4,828,090	2,040,290	29.7

Table 4. Comparison of average costs and percentage of savings per each service by Day Care method according to the subject of cost (Rials)

Cost definition	Average amount of Cost reduction	Average percent of cost reduction
operating room drugs	Not significant	Not significant
operating room consumable supplies	Not significant	Not significant
ward drugs	115500	85
ward medical consumable supplies	154018	93
general consumable supplies	16500	92
*physicians payments	182000	Not significant
brokerage of the surgeon	Not significant	Not significant
Anesthesia	Not significant	Not significant
operating room costs	Not significant	Not significant
personnel costs	997000	57
support personnel costs	Not significant	Not significant
food costs	400000	62
laundry costs	Not significant	Not significant
general administrative costs	166340	50
Total		2031358

•For their visits in ward

If a patient is hospitalized, the doctor should visit the patient on daily basis. While in day care surgery, the doctor visits the patient in the clinic or office one day before surgery and there is no need to re-visit the patient before the operation and the patient is usually discharged by a nurse’s instructions on the same day of surgery. In addition, doctors may prescribe more medications for the patients stay longer in hospital. Costs of consumables in the inpatient ward also increase as a result of repeated visits from physicians and nurses.

Furthermore, the results indicated that there was substantial savings in inpatient’ personnel, food and general administration costs. Reduction in personnel costs is mainly result of dropping in patient hospitalization and consequently reduction in need for nurses and other medical personnel. In addition, by reduction in patients’ hospital length of stay, costs of food and administration costs are expected to decrease.

The results showed that, as one might expect, the costs related to the surgical procedures and operating room costs were identical in both methods. This might suggest that the methods of surgeries and anesthesia, and quality of materials and supplies utilized in the operating room have been similar in both inpatient surgery and day-care surgery methods.

The findings of the current study indicated that with establishing the day-care surgery, on average cost of surgery reduced by 29%. This is comparable with previous studies conducted in other settings, mostly developed countries [20-22]. For example, studies on Hernia repair operation have reported a reduction between 12% and 70% in hospitalization costs of cases underwent surgery in day-care method [13, 15, 17, 20].

Although the cost savings have shown in this study are not as large as might be thought on the basis of average daily hospital costs, these savings are nevertheless substantial, considering the large number of patients who are likely to be able to benefit from day-care surgery method.

Bed-occupancy rate in the inpatient surgery ward, in the period before launching of day-care surgery ward, was 84%, while the bed-occupancy rate of the new ward was 40%. This implies that cost savings can be higher by increasing the number of surgeries in this method, as results of economies of scales.

This study has a number of limitations. Costs of diagnostic tests (e.g., radiography, and pathology tests), which took place before admission of the patients, were excluded in this study. In addition, cost items such as opportunity cost of using capital items (i.e., depreciation) and costs (both direct non-medical and indirect) incurred by the patients and their family (e.g., transportation costs and opportunity costs of time off work) were not measured by this study. Moreover, the savings reported in this study are the result of comparing day-care surgery with hospital length of stay of two-days for inpatient surgery. But standard practice of many surgeons is to recommend stay longer than two days, so the potential saving in moving to day-care surgery method could be larger.

Conclusion

The findings from this study demonstrate that day-care surgery is a cost saving method compared to in-patient surgery for five most common general surgical procedures. In day-care method, the turnover of patients tends to increase, resulting in a reduction in the overall cost per patient, and a decrease in waiting lists. It is

recommended that hospital managers consider establishing day-care ward and conducting surgical procedures, in particular elective general surgical procedures, in this regimen, to decrease hospital costs and to make hospital beds free, for other patients who are more in need of specialized medical and nursing skills.

Competing Interests

The authors declare that there is no conflict of interests.

Authors' contributions

AA, MG and AR were involved in the study conception and design, data collection, analysis, revision, editing and drafting of the manuscript. HHB participated to the study conception and design, results interpretation, critical revision of the manuscript for important intellectual content. FEA, NY and MHS participated to the results interpretation and critical revision of the manuscript for important intellectual content. All authors read and approved the final manuscript.

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