

Original Article

Day surgery management model in china: practical experience and initial evaluation

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Abstract: Objectives: Day surgery has been increasingly performed in some major teaching hospitals in China. We aimed to evaluate the current day surgery management model (DSMM) and compare the clinical outcome and health service utility of day surgery with inpatient surgery. Methods: We reviewed 14482 day surgery cases under the DSMM and 2591 inpatient surgery cases under the non-DSMM between September 2006 and September 2012 in Shanghai East Hospital. The endpoints of interest were hospitalization days, incision infection rate and hospital cost. Results: Among 14482 day surgery cases, only 52 (0.4%) were converted to hospitalization. The average hospitalization time of the patients was 2-10 hours. None of them had incision infection. Hospital cost of DSMM was less than 50% of non-DSMM (inpatient surgery). The most common postoperative complications were nausea, vomiting and dizziness. Nearly half of patients had mild to moderate pain after surgery. Conclusions: DSMM optimizes the utilization of healthcare resources by reducing hospital admission, hospital cost and incision infection in China.

Keywords: Day surgery management model, evaluation, health resource, hospital cost, incision infection

Introduction

Day surgery is also known as outpatient or ambulatory surgery. It is usually associated with short time, low risk of infection, fast recovery and low cost. Day surgery has been increasingly accepted by clinicians, patients/families, and insurance agents [1]. At present, day surgery is performed increasingly in some major teaching hospitals in China. In our hospital, day surgery cases rose from 1.5% in 1982 to 5.1% in 1994. The proportion of workload for day surgery also rose from 12.0% in 1982 to 28.0% in 1994 and 62.5% in 2012. Day surgery may have a remarkable impact on medical education. Patients who could be admitted for an inpatient surgery with previous criteria may be indicated for a day surgery [2]. Since September 2006, Shanghai East Hospital has launched a day surgery management model (DSMM) and now except for Departments of Cardiothoracic Surgery and Neurosurgery, all surgical specialties provide day surgery under DSMM. The purpose of this report was to evaluate the current day surgery management model (DSMM) and

compare the clinical outcome and health service utility of day surgery with inpatient surgery.

Patients and methods

Patients

We reviewed a total of 14484 patients who received day surgery in our hospital between September, 2006 and September, 2012. Their mean age was 44.5 (range, 17-72) years. The types of day surgery included laparoscopic cholecystectomy (45 cases), inguinal hernia repair (224 cases), appendectomy (45 cases) for both acute and chronic appendicitis, procedure for prolapse and hemorrhoids (PPH, 1325 cases), internal fixation removal in orthopedics (320 cases), obstetrics and gynecologic surgeries (12243 cases, including vacuum aspiration, diagnostic curettage, and IUD removal), and resection of rectal polyps under electronic fiber colonoscopy (252 cases). The modes of anesthesia in day surgery included general anesthesia, lumbar anesthesia, epidural anesthesia and intravenous anesthesia.

Day surgery management model

Table 1. Hospital stay between day surgery and inpatient surgery

Group	Day surgery (DSMM)		Non-day surgery (non-DSMM)	
	No. of cases	Average stay (days)	No. of cases	Average stay (days)
Group A	12	1.10±0.28	268	8.60±0.83*
Group B	7	1.00±0.00	48	10.00±2.42*
Group C	6	1.00±0.00	188	6.77±1.53*
Group D	17	1.00±0.00	42	13.41±3.89*
Group E	4386	1.00±0.00	24	3.54±1.07*
Group F	52	1.00±0.00	21	3.21±0.51*

* $P < 0.05$ Mann-Whitney U test. DSMM: day surgery management model.

Day surgery management model (DSMM)

Day surgery covers a wide spectrum of surgical procedures, embracing all surgical specialties, from operations under local anaesthesia to major ones under general anaesthesia. We established self-contained unit on hospital site-operating theatres and ward dedicated to day-case surgery and functionally separate from the inpatient areas of the hospital. Nurses and administrative personnel are dedicated to the day unit. Many surgical specialties working in the same unit share operation rooms, resuscitation rooms, wards, general anesthesia devices, monitors, oxygen breathing system, pacemaker defibrillator, suction system, rescue vehicle and so on. DSMM is also staffed with experienced anesthetists, who are able to independently carry out general anesthesia, various anesthesia procedures, resuscitation and others. If a patient is discharged on the same day, he or she is transferred to the corresponding inpatient departments for continued observation and treatment until all the discharge criteria are met. Within 24 hours after discharge, our staff will follow up the patient or family by phone.

Study endpoints

Day surgery was classified into 6 groups as below: Group A (laparoscopic cholecystectomy), Group B (inguinal hernia repair), Group C (appendectomy for acute or chronic appendicitis), Group D (internal fixation removal in orthopedics), Group E (painless family planning operations), and Group F (resection of rectal polyps under electronic fiber colonoscopy).

Patients underwent day surgery between September 1, 2006 and December 30, 2012 and 591 cases of inpatient surgery (Non-DSMM) under the same category were enrolled in our study.

Statistical analysis

We compared the difference in hospitalization time, postoperative recovery, incision infection, and hospital cost under the same category between DSMM and non-DSMM. Data were summarized as mean \pm standard deviation. Numeric data were tested by the nonparametric tests (Mann-Whitney U test) and category data by Chi-squared test. $P < 0.05$ was considered statistically significant.

Results

Hospitalization

Among 14484 patients who underwent day surgery, only 355 (0.02%) were transferred to ward and then converted to inpatient surgery. Two cases of laparoscopic cholecystectomy were admitted to hospital due to unstable vital signs and then discharged in 48 hours. Three cases of painless surgical abortion were admitted due to postoperative bleeding. The average stay in hospital for the remaining patients was one day (about 2-10 hours), which was significantly shorter than that of inpatient surgery (**Table 1**).

Incision infection

Table 2 summarizes the incision infection rate of day surgery and inpatient surgery patients. None of the day surgery patients had incision infection in this study. There was no statistical difference in incision infection rate between the two groups ($P > 0.05$).

Hospital cost

Comparison of per capita hospital costs for 6 groups of patients treated by DSMM and non-DSMM revealed no difference in costs among the groups (**Table 3**).

Day surgery management model

Table 2. Comparison of incision infection between day surgery and inpatient surgery

Group	Day surgery (DSMM)		Inpatient surgery (non-DSMM)	
	No. of Case	Incision infection	No. of Case	Incision infection
Group A	12	0.00%	268	1.10%
Group B	7	0.00%	48	0.00%
Group C	6	0.00%	188	1.06%
Group D	17	0.00%	42	0.00%
Group E	4386	0.00%	24	0.00%
Group F	52	0.00%	21	0.00%

P > 0.05 Chi-squared test. DSMM: day surgery management model.

Table 3. Service costs of day surgery

Group	Day surgery (DSMM)		Inpatient surgery (non-DSMM)	
	No. of patients	Cost (RMB)	No. of patients	Cost (RMB#)
Group A	12	4412.26±354.28	268	11043.98*
Group B	7	1791.97±225.77	48	6247.29*
Group C	6	1557.03±198.65	188	5440.61*
Group D	17	2589.30±125.49	42	3655.24*
Group E	4386	650.59±50.85	24	1321.55*
Group F	52	651.17±74.62	21	1330.23*

**P* < 0.05 Mann-Whitney U test. #One US dollar (\$) equals RMB¥6.16. DSMM: day surgery management model.

Follow-up

We followed up each patient by phone within 24 hours after discharge and scheduled a clinic visit between postoperative day 3 and day 7. No severe complication was found in our patients. Of the total, 2592 patients (13%) developed mild and transient dizziness, nausea and vomiting, and 5950 patients (41.0%) had mild to moderate pains, which were controlled by pain medications.

Discussion

Benefits of day surgery include low risk, short operation time and fast recovery. Day surgery is usually performed in one complete operation room. After a short recovery and postoperative care, patients can return home. According to literatures, day surgery was relatively safe with a low death rate (about 1/66500) and severe complication incidence (about 1/1455). The infection rate for day surgery is obviously lower than that for inpatients [1]. Geriatric patients who undergo day surgery should be eligible for the 'fast track' [3]. Although hemodynamic change is commonly seen, day surgery is rarely complicated with major cardiac adverse events. For patients with controlled obstructive sleep apnea (OSA), day surgery under local anesthe-

sia or regional block anesthesia may also have low risk in operation. Without the use of sedatives or analgesic doses of anesthetics, the patient may not stay in hospital postoperatively for treatment [4]; few day surgeries lead to adverse outcome in diabetics, and also do not increase risks for laryngoscopy in diabetic patients [5].

Currently, day surgery has been extensively applied in Europe, the United States, Hong Kong and Macao, and has achieved good social and economic outcome. In Hong Kong, nowadays the number of day surgeries performed in government hospitals has exceeded 140,000 cases each year. Their preliminary goal is that in the future 1/10 of surgeries requiring general anesthesia will be done as day surgery without hospitalization [6]. In China, due to the inadequate facilities, inexperienced management and insufficient supporting system, day surgery under DSMM can be only applied to a few limited types of surgery and mainly performed in major teaching medical centers in metropolitan cities.

Day surgery is characterized by being "short, stable and fast", thus decreasing many procedures for surgical inpatients. Currently, owing to increasing shortage of medical treatment and

Day surgery management model

financial condition, day surgery has good development trend [7]. The advantage of day surgery is that patient waiting time is remarkably shortened so that we would be able to schedule more patients in a day. For instance, a day surgery centre in the United States performed 3000 operations in the first year of its establishment. By calculation of 75% patients requiring 2 days of hospitalization, 4500 hospital bed days were saved. Then, with 4884 day surgeries in one year, 6789 hospital bed days were saved accordingly. With limited healthcare resources in China, day surgery can speed up patient turnover rate, shorten hospital bed days, decrease insurance burden and improve hospital profit. Hospital acquired infections were also reduced remarkably. According to statistical data on day surgery patients in that hospital, none of the patients developed infection, which also further reduced healthcare cost. From the historical experience abroad in the last decade, day surgery markedly reduces national and individual economic burdens. Short hospital bed day and low incidence of infection reduced total cost by 50%.

Through analysis and review of DSMM in our hospital, we have also identified our initial experiences in DSMM operating: (1) dizziness, nausea and vomiting were more common in patients. In our department, there were about 5950 patients who had various degrees of these symptoms. In addition to patients' own condition, it was thought that these discomforts were associated with anesthesia, operator's skill, and perioperative medications. We believe a well-prepared preoperative assessment, careful anesthesia mode selection, proper surgical procedures, rational medication and postoperative management are able to minimize the incidence of these symptoms. (2) Sufficient pain control: It was reported that due to delayed anesthesia effects, patients felt less pain in hospital; but 24 hours after surgery, about 2/3 patients felt severe pain and relied on pain medications for 2 days. (3) The success of day surgery depends on several important management factors: a practical management protocol, a highly efficient operating system and a multidisciplinary service team.

In conclusion, DSMM optimizes the utilization of healthcare resources by reducing hospital admission, hospital cost and incision infection in China.

Disclosure of conflict of interest

None.

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