

Day surgery for children

Harold T. Davenport, M.B., F.F.A.R.C.S.,
Chandrakant P. Shah, M.B., M.R.C.P.(GLAS.), F.R.C.P.[C], and
Geoffrey C. Robinson, M.D., F.R.C.P.[C], Vancouver, B.C.

The increasing cost of health services, particularly hospital services, prompted the federal government in Canada to appoint a task force to inquire into methods of restraining the rate of increase while maintaining and improving the quality of care.¹ In 1967, 4.59% of the Canadian gross national product was spent on health care and 62.4% of that (amounting to 1.9 billion dollars) was spent on hospital services. The rate of increase since 1957 had been about 282%. Several alternatives to the provision of acute-care beds have been proposed and the present report deals with one such alternative, surgical day care. In Vancouver it has been shown^{2, 3} that approximately one-quarter of all the admissions to children's units in the regional hospital district can be cared for in ambulatory surgical units. Subsequently, controlled studies of medical complications and parental attitudes towards surgical day care were undertaken,⁴ which demonstrated that day surgery was a safe and economical alternative to conventional hospitalization and was acceptable to parents and professionals alike. Based on this work, a Day-Care Surgical Unit of 10 beds was opened by Children's Hospital in Vancouver.

The day-care surgical program

The Day-Care Surgical Unit

This unit is defined as a hospital facility in which children are admitted and discharged on the day of operation and where certain elective surgical procedures and operations are carried out.⁴ The unit is unlike a hospital ward, and features bright colours on walls and ceiling, subdued lighting, carpeting, and pictures on the wall. There are 10 stretcher beds which are separated by curtains. There are books and games in abundance to distract the children, and seating is provided for the parents beside the stretchers. There are toilet facilities, work space and a central

desk area, together with lockers for each patient's possessions. The nurses wear coloured dresses or pant suits and are not hurried or overworked. Functioning hours of the unit are 7.00 a.m. to 8.30 p.m. five days a week, and it is possible to handle up to 16 short-stay patients in a day.

Selection of patients

The cases are selected by the surgeons. Surgeons are not in agreement concerning the use of day care for neonates and infants under 6 months of age who require elective surgery, but some consider there are advantages to this form of management for this age group.⁵ Although some physicians have expressed reservations about this form of care for patients with chronic disease, patients with controlled convulsions, cerebral palsy, asthma, cystic fibrosis, stabilized congenital heart disease, and well-regulated diabetes are accepted for day-surgery. On the other hand, patients with bleeding tendencies, liver insufficiency, incipient heart failure, uncontrolled diabetes or infectious diseases are considered unsuitable for this form of care. The policy recently stated by Cohen and Dillon⁶ that "no prospective candidate is denied outpatient surgical service because of anesthetic requirements" has been consistently followed.

The inability of parents or guardians to care for the child at home following surgery is considered by the surgeon in his office during consultation and by the hospital staff on the day of operation. Where there is doubt, conventional admission is discussed as an alternative.

Patient procedure

During the consultation the surgeon explains to the parents that the operation their child needs will be done on a day-care basis. The possibility of conventional admission becoming necessary is explained to every child and his family to avoid their being upset by a sudden change of plans. The date for the child's operation is booked by telephone, and the surgeon then forwards a copy of the consultation report together with a surgery booking card to the hospital. This card provides basic information concerning the patient and the details of the

operation planned and its estimated duration. The hospital sends the family a folder* which sets forth preoperative instructions, postoperative advice and pertinent general hospital information. The need and reason for the patient to have an empty stomach at the time of operation are emphasized, as is the requirement that a person *who is not* the car driver should take care of the child during the journey home.

The day before the operation the family is phoned and most of the admission information obtained. On this occasion parental inquiries are answered, preoperative instructions are reinforced, and the exact time of arrival at the hospital is arranged. When the patient is admitted to the Day-Care Surgical Unit one to two hours preoperatively, a minimum of documentation remains to be completed. A urine specimen obtained at home is brought for analysis, and weight and hemoglobin estimations are done on arrival. The child's Medical History Questionnaire* is completed by the accompanying parent or guardian. The patient is examined by an anesthetist and preoperative medications are ordered. If there are symptoms and signs of acute upper respiratory or other infection the operation is cancelled. Usually chloral hydrate, 40 mg. per kg. and hyoscine, 0.008 mg. per kg. are given orally in a palatable form to children whose weight is less than 50 kg. (14 years of age).⁷ If oral sedation is refused and the child is fearful, 10% thiopental sodium (40 mg. per kg.) is administered per rectum, the excess being withdrawn when the sedation is evident. No sedation is routinely given to older children, but each patient's need is considered separately. Anesthesia is purposely simplified, with nitrous oxide, halothane and methoxyflurane as the main agents. Endotracheal intubation is freely employed when indicated and is usually accomplished with topical anesthesia without relaxants. Each child passes through the main operating room and recovery suite and returns to the Day-Care Surgical Unit fully conscious and with stable vital signs. Pethidine hydrochloride, 1 mg. per kg. orally or intramuscularly, is used to relieve severe pain, while dimenhydrinate, 2 mg. per kg. intramuscularly or in rectal suppository form, is given if vomiting is troublesome. While the

*Available from the authors on request.

From Children's Hospital, Vancouver, and the Department of Paediatrics, University of British Columbia.

Reprint requests to: Dr. H. T. Davenport, Children's Hospital, 250 West 59th Avenue, Vancouver, B.C.

child is in the operating theatre and recovery room the parents may remain in the Day-Care Surgical Unit or leave and return as they desire. Each patient is examined by a staff anesthetist before discharge, and the nurse makes sure the family have all the instructions necessary for the care of their child. On arrival home parents are encouraged to call the hospital for further help if they are unable to contact their own doctor or surgeon. Before leaving the hospital the family is told to expect a phone call from the nurse on the following day to enquire about the patient's condition.

A report of the day-care surgical program

Methodology

Data were collected for all children operated on as day patients between the introduction of the program in December 1967 and March 1970. Data included demographic information, type of operation, duration of anesthesia, duration of hospital stay following operation and reason for admission to hospital overnight when required.

In the last three months of data collection, when telephoned on the day after operation by the nurse, parents were asked about the complications experienced by their child. Complications were specified and graded as to degree: one that was complained of but for which no action or intervention was required was classified as "mild"; a "moderate" complication was one severe enough to call for some action, such as administration of a medication or treatment, but not requiring the presence of a physician or hospitalization.

Parents were presented with eight attitude statements concerning their experience with the program. In order to reduce bias due to response set,^{8, 9} the statements were worded so that agreement did not always indicate a favourable attitude towards either surgical day care or conventional hospitalization. Parents were asked to respond in terms of "yes", "no" or "no opinion" to the statements.

Results

Certain characteristics of the children are presented in Table I. About 45% were under the age of 5 years and 92% were from Metropolitan Vancouver. The type of operation and mean duration of anesthesia for each are shown in Table II. Approximately 50% of children had dental restorations and

were under anesthesia about 100 minutes.

The duration of the hospital stay following operation is noted in Table III. Of the children who were discharged on the day of operation, most left the hospital within eight hours. About 5% required conventional hospitalization following surgery. The most frequent reasons for hospitalization were mild respiratory problems (hoarseness or croupy cough),

Table I
The study population

	No.	%
Total number of children	833	100.0
Age group (years)		
Under 1	36	4.3
1-4	341	40.9
5-9	304	36.5
10-14	116	13.9
15	36	4.3
Sex		
Male	460	55.2
Female	373	44.8
Residence		
Metropolitan Vancouver	767	92.1
Non-Metropolitan Vancouver	66	7.9

Table II
Type of operation and mean duration of anesthetic time

Type of operation	No.	%	Mean duration of anesthetic time in minutes
Teeth extraction and repair	412	49.5	99.3
Myringotomy	97	11.6	25.3
Cystoscopy and panendoscopy	73	8.8	18.7
Excision of lesion	52	6.2	34.6
Herniorrhaphy	45	5.4	59.1
General surgery (other)	37	4.4	27.0
Squint repair	25	3.0	40.4
Eye (other)	41	4.9	24.9
Other*	51	6.1	24.8
Total	833	99.9	

*Including removal of foreign bodies, and implants (e.g. silicone); removal of cast; removal of pins; closed reduction of fracture; reapplication of casts; wedge resection of ingrown toenail; revision of post-traumatic deformity of finger, etc.

other medical problems and excessive vomiting. Complications on the first postoperative day reported by parents were mild in nature (Table IV).

Parental attitudes toward certain statements are given in Table V. Most of the parents disagreed with the statement that their child would be more comfortable or safer in hospital, and agreed that he was happier at home. About 91% of parents said that a home visit by a nurse would not be of any value and 87% of them said that they would prefer day-care surgery for subsequent elective operation.

Discussion

Most operations, even those com-

Table III
Duration of hospital stay and reasons for hospitalization following surgery

Length of hospital stay if discharged on day of surgery	No.	%
1-4 hours	404	51.2
5-8 hours	357	45.2
9-19 hours	25	3.2
No information	3	0.4
Total	789	100.0

Reasons for in-patient admission

Reasons for in-patient admission	No.	%
Respiratory	10	22.7
Other medical or surgical problems	10	22.7
Late booking in afternoon	9	20.5
Excessive vomiting	8	18.2
Emotional	2	4.6
Other anesthetic complications	1	2.3
No abnormality	4	9.1
Total	44	100.0

Table IV
Complications on day following surgery as reported by parents

Complications (% of total-184)	Total No. of parents interviewed		Total No. of parents responding	
	No.	%	No.	%
	184		184	
			Mild	Moderate
Nausea	30	16.3	4	2.2
Vomiting	33	17.9	6	3.3
Sore throat	13	7.1	1	0.5
Hoarseness	13	7.1	1	0.5
Cough	17	9.2	2	1.1
Difficulty in voiding	14	7.6	2	1.1
Irritability	29	15.8	4	2.2
Pain at site of operation	48	26.1	2	1.1

monly done under local anesthesia in adults, require general anesthesia in children. At the beginning of the century, day-care surgery was discussed and practised out of necessity.¹⁰ Until the last two decades general anesthesia for children often caused prolonged and severe disturbance postoperatively. Inferior home conditions for a greater proportion of the population than at present tended to curtail family participation in postoperative care. Also, until the advent of modern psychiatry, little concern was shown for the psychic trauma that may be caused by hospital admission. With major changes in all the above factors, it is appropriate to re-examine the subject. While in recent years much has been written about day-care surgery in adults,¹¹⁻¹⁸ less has been written about this subject as applied to children.^{5, 19-21}

The findings of the present study indicate that certain surgical procedures can be handled by day care and that this form of care is quite acceptable to the medical profession and to the parents. This is supported by the fact that the program has grown impressively since its inception three years ago.* In the previous study⁴ most of the parents whose children had a day-surgery experience, followed by a home visit by a nurse, considered this visit to be important. In the present study, however, there was no home visit by a nurse, and the majority of the parents replied that such a visit would have been of little value. This seems quite logical in the light of the few and mild complications following surgery. There may be

*The number of children operated on, on a day-care basis, in 1967, 1968, 1969 and 1970 at Children's Hospital were 5,201, 466 and 1105 respectively.

a need for home visits by a nurse after operations in selected cases where parents are apprehensive.⁴

In the past, general anesthesia in the pediatric outpatient has been governed by such factors as the parents' wishes, the insistence on the patient's perfect state of health and the amount of pressure on the available in-patient beds. Also, some anesthetists maintained that no intubated patient should be discharged on the operative day. In the present experience these various considerations have not been determinants in the selection of cases. Parental attitudes are influenced greatly by explanation by the surgeon and by the experience of others in their community. Patients with controlled chronic diseases can be satisfactory subjects. Endotracheal intubation is not hazardous provided it is expertly managed, so that this technique need not preclude early discharge.

A separate day-care surgical unit has advantages over the usual facilities of the hospital. Admission and management can be streamlined, patients associate with those undergoing the same process, and nurses who have this work as their total responsibility become expert in pre- and post-operative support. Parents who have expressed qualms, in most instances wished only to have an extra 12 hours in hospital for their children.

To undertake day-care surgery, the surgeons must change certain aspects of their work. A consultation history must be provided for the hospital and cannot be the task of the hospital staff. Surgeons must be sure of the high standard of their work and if it is to be delegated must be confident that it is of the same quality. They must be readily available postoperatively for any call that requires their attention.

Likewise, the work load of the anesthetist is more concentrated and increased. He must take final responsibility for his assessment, both pre- and postoperatively, and this implies sufficient staff within the operating hours during the day. It is also important that newer anesthetic agents be investigated for use in day surgery.

The economic benefits of day surgery are readily apparent. Formerly these patients were requiring approximately three bed days and now they stay for only half a day. Waiting lists for elective surgery have dropped and acute-care beds which were previously used by these patients are freed for others. This in turn has reduced pressure on expensive acute-care beds and also will further reduce the urgency of provision of acute-care beds for children in the hospital region.²² In England it has been stated that a pediatric surgeon could save about £250,000 in 20 years if he organized day surgery for one operating session per week.²³ Thus, short- and long-term economic benefits which accrue from this form of care are appreciable. Wider provision of this type of facility would seem warranted today when government, professionals and the public are greatly concerned about the rising cost of health services.

It is our opinion that day-care surgical units should be small and widely dispersed to be of most value to the public and to the profession and to maintain their friendly, concerned atmosphere. A thoughtful economist has said that "improvements in the delivery of health services require making medical care more effective, producing it more efficiently and distributing it more equitably".²⁴ Day-care surgery may help in the application of these principles if it can be widely adopted.

The authors would like to thank the study nurse, Mrs. N. J. Gray, for her contribution, and the Unit nurses for their enthusiastic support. The program was made possible through the support of the staff surgeons (Dr. R. Marshall, Chief Surgeon) and the hospital administration (Mr. H. P. J. Gunn, Administrator).

References

1. Task Force Reports on the Cost of Health Services in Canada: Vols. 1 and 2. Ottawa, Queen's Printer, 1970
2. ROBINSON GC, SHAH CP, ARGUE C, et al: A study of the need for alternative types of health care for children in hospitals. *Pediatrics* 43: 866, 1969
3. ROBINSON GC, TONKIN RS, KINNIS C, et al: A study of regional pediatric bed utili-

Table V
Parental attitudes towards certain statements

	Yes		No		No opinion	
	No.	%	No.	%	No.	%
Attitudes (% of total - 184)						
Activity restricted?	99	53.8	85	46.2	0	0.0
Need help of doctor?	9	4.9	174	94.6	1	0.5
Problems in caring for child at home?	15	8.2	168	91.3	1	0.5
Child more comfortable in hospital?	8	4.3	172	93.5	4	2.2
Child safer in hospital?	8	4.3	167	90.8	9	4.9
Child happier at home?	174	94.6	7	3.8	3	1.6
Home visits by a nurse of value?	11	6.0	167	90.8	6	3.3
If you had to do it again, would you prefer your child to go home on evening of surgery?	161	87.5	17	9.2	6	3.3

zation and some implications for regional planning. Unpublished report

4. SHAH CP, ROBINSON GC, KINNIS C, et al: Day surgery for children: a controlled study of medical complications and parental attitudes. *Medical Care*. In press
5. OTHERSEN BH, CLATWORTHY NW: Outpatient herniotomy for infants. *Am J Dis Child* 116: 78, 1968
6. COHEN DD, DILLON JD: Anaesthesia for outpatient surgery. Springfield, Ill, Thomas, 1970
7. STETSON JB, JESSUP GV: Use of chloral hydrate mixture for pediatric premedication. *Anesth Anal* 41: 203, 1962
8. CRONBACH LJ: Response sets and test validity. *Educ Psychol Meas* 6: 475, 1946
9. CRONBACH LJ: Further evidence on response sets and test design. *Educ Psychol Meas* 10: 3, 1950
10. NICHOLL JH: The surgery of infancy. *Br Med J* 1: 755, 1909
11. CROSSEN G, DOENICKE A, DUNDEE JW, et al: Symposium on general anesthesia for outpatients. *Acta Anesth Scand Supplement* 25: 403, 1966
12. World Congress III, September 1964. Panel discussion, Intravenous anesthesia for outpatients, edited by ZINDLER M, *Acta Anesth Scand Supplement* 17: 1, 1965
13. COHEN DD, DILLON JD: Anesthesia for outpatient surgery. *JAMA* 196: 1114, 1966
14. TRELOAR EJ: Outpatient anesthesia. *BC Med J* 8: 419, 1966
15. CARIDIS D, MATHESON N: Outpatient surgery. *Lancet* 2: 1387, 1964
16. STEPHENS FO, DUDLEY HA: An organization of outpatient surgery. *Lancet* 1: 1042, 1961
17. SUTHERLAND JS, HORSFALL GL: Anesthesia for the outpatient treatment of hernia and varicose veins. *Ibid*, p 1044
18. RUCKLEY CV, MACLEAN M, SMITH AN, et al: Team approach to early discharge and outpatient surgery. *Lancet* 1: 177, 1971
19. KAY B: Outpatient anesthesia, especially for children. *Acta Anesth Scand Supplement* 25: 421, 1966
20. LAWRIE R: Operating on children as day-cases. *Lancet* 2: 1289, 1964
21. CHIANG TM, SUKIS AE, ROSS DE: Tonsillectomy performed on an outpatient basis. *Arch Otolaryngol* 88: 307, 1968
22. TONKIN RS, ROBINSON GC, KINNIS C, et al: A projection of future needs for hospital beds and ambulatory facilities for children. *BC Med J* 12: 303, 1970
23. DRAPER P: Cutting the cost of health care. *Lancet* 2: 601, 1970
24. FUCHS VR: Improving the delivery of health services. *J Bone Joint Surg [Am]* 51A: 407, 1969

Leiomyoma of the uterus with bilateral pulmonary metastases

R. Lefebvre, M.D., D.Sc., T. Nawar, M.B., B.Ch., R. Fortin, M.D. and J. Genest, C.C., M.D., F.A.C.P., F.R.C.P.[C], Montreal

The unexpected discovery on a routine chest roentgenogram of innumerable nodular opacities involving both lungs is usually an ominous finding, suggesting a malignant process even in a symptomless patient. The unabated persistence of such an exceptional x-ray picture over a period of 15 years, with only mildly increasing respiratory complaints, would normally eliminate metastatic disease. The present case illustrates that histologically benign uterine leiomyomata may metastasize diffusely to the lungs and be associated with exceptionally prolonged survival. An added feature of this case was the development terminally of a peripheral adenocarcinoma in one lung.

Case history

A 48-year-old unmarried white woman was first admitted to hospital in October 1944 because of a tender pelvic mass. A subtotal hysterectomy and bilateral salpingo-oophorectomy were performed for a uterine "fibroid". The uterus weighed 420 g. The corpus was deformed by a single, large, firm mass; on cut section the latter measured 11 cm. in diameter and was sharply circumscribed. Histologically the tumour was rich in muscle cells with little intervening connective tissue and displayed none of the usual criteria of malignancy (Fig. 1). At this date there were no respiratory complaints and no radiograph was taken.

In November 1953 the patient, now aged 57, was admitted to hospital because of mild exertional dyspnea which had become manifest three years earlier. A chest roentgenogram showed that both lungs were studded with numerous circular opacities concentrated mostly in the lower lobes (Fig. 2). Bronchoscopy was reported as normal; the sputum and bronchial aspirate contained no acid-fast bacilli, fungi or malignant cells. The thyroid was enlarged and nodular. There was no radioactive iodine uptake by the nodules in the lungs. Despite this finding, a diagnosis of thyroid cancer with multiple bi-

lateral pulmonary metastases was considered most plausible, and a total thyroidectomy was performed. Histological examination of the thyroid showed a diffuse Hashimoto's thyroiditis with no evidence of malignancy. Following this operation, thoracotomy was advised but the patient declined, and persisted in refusing this procedure over the years.

Three months later she was readmitted to hospital with clinical features of hypothyroidism and mild exertional dyspnea. Blood pressure was 180/115 mm. Hg. A chest radiograph revealed the same nodular opacities throughout both lungs.

For the next 15 years the patient was followed up regularly in the hypertension clinic. Chest roentgenograms were performed at six-monthly intervals and revealed no apparent progression or regression of the nodular lesions.

Between 1961 and 1968 the patient was hospitalized on five occasions, each time because of slowly progressive dyspnea with episodes of ankle edema. Electrocardiograms showed myocardial ischemia and a first-degree AV block. Her medica-

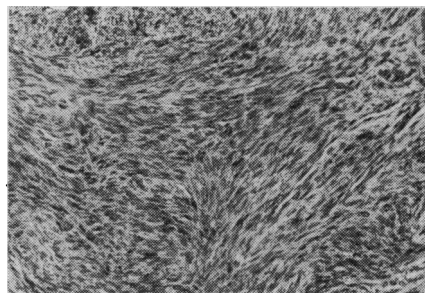


FIG. 1—Uterine leiomyoma removed in 1944. In spite of the compact structure and richness of muscle cells, no malignant features are present. (Hemalum, ploxine and saffron, 250 x.)

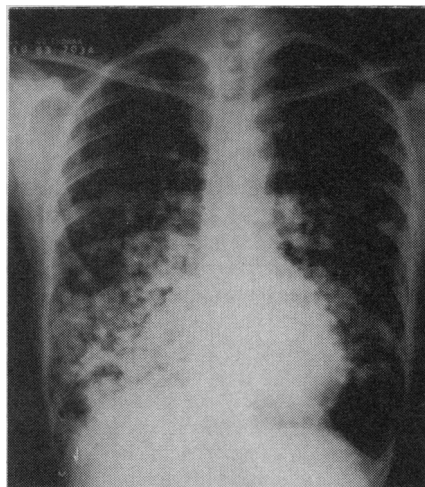


FIG. 2—Chest roentgenogram showing nodular opacities in both lungs in 1953.

Erratum

In the report of the patient with Multiple trauma (Trauma Rounds, July 10, 1971) Figs. 7a and 7b (p. 86) are of a selective celiac arteriogram, not a splenoportogram as indicated.

From the Department of Pathology and the Hypertension-Nephrology Service of the University of Montreal; Hôtel-Dieu Hospital, Montreal; and the Clinical Research Institute of Montreal.
T. NAWAR, M.B., B.Ch., Fellow of the Medical Research Council of Canada.

Reprint requests to: Dr. Jacques Genest, Scientific Director, Clinical Research Institute of Montreal, 110 Pine Avenue West, Montreal 130, Quebec.