

# Maximizing Efficiency in Cataract Surgery: A Model Program

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1

## **OBJECTIVES**

Cataract removal is an increasingly common surgical procedure. Today in Canada, however, the waiting time for this procedure may be unacceptably long for many patients.

The case presented here demonstrates the impact that increased efficiency can have on cataract surgery waiting lists. At Hôtel-Dieu Grace Hospital in Windsor, Ontario, examination of surgical and administrative procedures, from patient arrival to departure from the hospital, identified inefficiencies and bottlenecks in patient flow. Over several years, correction of individual problems led to stepwise improvements in efficiency. Today, the Hôtel-Dieu Grace Hospital cataract surgery program achieves high efficiency by combining faster technology and surgical techniques, more streamlined patient care procedures and improved patient flow strategies. The principles and approaches presented in this case can be applied to improve the efficiency of any cataract surgery program.

Hôtel-Dieu Grace Hospital is a large acute care community hospital that employs over 1,730 staff with 191 active medical staff. The hospital has a high percentage of tertiary services and provides the regional programs for trauma, renal dialysis, neurosurgery, cardiac catheterization, adult acute psychiatry, ophthalmology and magnetic resonance imaging for Windsor and Essex County, which has a population of approximately 375,000.

## SETTING

Pervasive problems with waiting times in the Canadian healthcare system have resulted in the federal government allocating substantial funding to address this issue. Six clinical areas – among them cataract surgery – have been designated as a priority focus for decreasing waiting times (Wait Time Alliance for Timely Access to Health Care 2005). The Wait Time Alliance, a working group that includes the six specialty societies most affected by this initiative, has been involved in the development of waiting time benchmarks. The Canadian Ophthalmological Society (COS), a member of the Wait Time Alliance, has stated that 16 weeks is a medically acceptable benchmark for waiting time for visually significant cataract surgery, with 90% of procedures ideally falling within this time frame. Since this recommendation was made, the Institute for Clinical Evaluative Sciences (ICES) has also stated that 16 weeks is an appropriate waiting time benchmark for cataract surgery (Tu et al. 2005).

Advances in cataract surgery, an aging population and healthcare budgetary constraints have combined to increase both the rate of cataract surgery (Table 1) and waiting times (Table 2) (Esmail and Walker 2004). The most recent ICES data indicate 102,182 cataract surgery procedures<sup>1</sup> were performed in Ontario in 2003–2004, approximately double those performed in the province in 1993–1994 (49,489) (Tu et al. 2005). The median waiting time for cataract surgery in 2003–2004, estimated to be 15 weeks, was unchanged from the previous two years. With a median wait time of 15 weeks, almost 50% of patients had waiting times longer than 16 weeks. The median waiting time in Ontario local health integration networks (LHINs) varied widely, from eight weeks in the Erie St. Clair LHIN, with 65% of procedures performed within 16 weeks, to 22 weeks in the South West LHIN, with 37% of procedures performed within 16 weeks.

2

Table 1. Cataract surgery procedures, 2003–2004\*

British Columbia	37,015
Saskatchewan	11,636
Ontario	100,760
New Brunswick	8,093
Nova Scotia	9,373
Prince Edward Island	760
Newfoundland and Labrador	3,069

\*Estimates, based on Canadian Institute of Health Information (CIHI) data, are incomplete, as many cataract surgery procedures are performed in private facilities. Furthermore, information in this format is unavailable for Alberta and Quebec and incomplete for Manitoba.

1. One cataract surgery procedure refers to surgery on one eye.

Table 2. Estimated number of patients waiting for cataract surgery in public facilities after specialist appointment, 2005

British Columbia	8,589
Alberta	3,651
Saskatchewan	7,452
Manitoba	1,061
Ontario	38,903
Quebec	52,882
New Brunswick	1,876
Nova Scotia	2,182
Prince Edward Island	431
Newfoundland and Labrador	656

### SEQUENCE OF EVENTS

In the late 1980s, a cataract surgeon could perform six to eight procedures a day, using extracapsular cataract extraction, a procedure that took 30 to 60 minutes under general anesthesia. Cataract surgery techniques began evolving rapidly, and in 1991, clear corneal surgery was introduced. Today, this small-incision technique takes only 5 to 10 minutes under topical anesthesia and requires no sutures.

Clear corneal surgery relies on the use of phacoemulsification for cataract removal. Phacoemulsification machines operate either on continuous vacuum or peristaltic pump systems. The Bausch & Lomb Millennium microsurgical system is the most efficient continuous vacuum system available and the one used at Hôtel-Dieu Grace Hospital. Continuous vacuum systems are substantially faster to calibrate and prime than peristaltic systems, and they allow a faster cataract surgery procedure. Clear corneal surgery also requires pliable, foldable lenses to be implanted, using an autoinjector.

Implementation of these technological advances allowed the number of cases a surgeon could perform in a day to increase. The author has increased his daily procedures to more than 40. As the surgical procedure itself became more efficient, the surgeon would be ready for the next case much sooner than before, but no patient was waiting. The adoption of these faster, more advanced technologies and refined surgical techniques provided the initial impetus to improve the efficiency of our cataract surgery program. We took our problem to the administration and found them completely supportive of our efforts to identify and eliminate all bottlenecks to patient flow.

The first change we made was having a dedicated orderly assigned to the program to speed patient transfers. The next bottleneck identified was the admitting process. The general day surgery admitting process is not structured to process large numbers of cataract surgery patients rapidly. Due to the brevity of the surgical procedure, even short delays in admitting cataract surgery patients can create a domino effect. In our

case, the admitting delay was affecting preoperative patient assessment and preparation. We addressed the admitting delay by having a dedicated admitting clerk assigned to the program and having this clerk start earlier in the morning (Taylor and Tremblay 1998). One policy change we made was eliminating routine preoperative investigations. This change eliminated delays due to last-minute testing in patients who had not already had the work done and streamlined preoperative assessment.

The next major traffic block identified was preoperative assessment and patient preparation. Again, our patients were being held up in the general day surgery process, so we requested dedicated nurses for assessment and preparation and an area outside the operating room where we could place a few stretchers. In this way, patients who were ready for surgery would be waiting near the operating room. Furthermore, as we were experiencing delays due to a shortage of stretchers, we acquired dedicated eye stretchers for the eye program.

With hospital amalgamation, the eye program moved to a self-contained unit at the current site. This move allowed inefficiencies related to distances within the hospital to be eliminated. Admitting, preoperative assessment and preparation, the operating room, recovery and instrument sterilization were now all located within a few steps of each other.

4

We then proceeded to make other changes to improve efficiency as much as possible. We standardized whatever it was feasible to standardize, including patient forms and discharge information, preoperative ocular preparation routines, surgical procedures, the anesthetist role, instrument packs and the role of the nurses. We also streamlined operating room processes, instituting a case cart system for surgical packs and picking lenses the day before surgery. We made use of volunteers to discharge patients, rather than the nurses who had previously performed this task, and we obtained the services of a ward clerk to prepare patient charts at least a day in advance of surgery. Importantly, we made extensive use of in-service programs to ensure that all eye program personnel were trained on procedural changes, as each individual had specific responsibilities that had to be fulfilled precisely to maintain patient flow.

Step by step, we continued to improve our efficiency. Today, the highly efficient and integrated Hôtel-Dieu Grace Hospital cataract surgery program performs approximately 6,000 cases annually out of one operating room. Patients having cataract surgery move through the following stages:

- *Admitting:* The hospital admitting procedure takes only a few minutes for each patient in a dedicated eye program admitting office.
- *Waiting room:* Admitted patients wait next door to the assessment area. Family members who accompany patients also wait here.
- *Assessment:* The assessment nurse directs patients across the hall to a change room to remove their clothing from the upper half of the body and put on a gown. The nurse then performs the five-minute preoperative assessment and directs the patient to the adjacent preparation room.

- *Preparation:* A nurse administers preoperative eye drops to the patient, and patients await transfer to an eye stretcher (between 15 and 60 minutes, depending on their time of arrival).
- *Perioperative holding area:* Patients who are ready for surgery are transferred to an eye stretcher immediately outside the operating room. The anesthetist inserts an intravenous line before the patient is moved to the operating room.
- *Operating room:* The patient is wheeled into the operating room, conscious sedation is administered and the procedure is performed. The patient is in the operating room approximately 10 minutes.
- *Recovery:* After the procedure, the patient is wheeled across the hall to the recovery area, where one nurse checks vital signs and removes the intravenous line, and the second nurse charts the results, ticking a series of boxes. One nurse calls for a waiting family member, while the other helps the patient dress. Once the patient is seated in a chair, volunteers give the patients juice and cookies and chat with them until they are discharged. The patient is usually in the recovery area for about 15 minutes.
- *Discharge:* The nurse reviews the discharge instructions with the patient and family member or caregiver, provides preprinted follow-up instructions and directs a volunteer to take the patient to the hospital exit.

5

## OUTCOMES

Efficiency was the outcome of interest. A retrospective evaluation identified a 60% increase in caseload over a four-hour period, with a turnover time that decreased from 20 minutes to less than 5.

## RESULTS

The following innovations were implemented to improve efficiency:

- *Volunteers:* A volunteer, rather than a nurse, discharges patients from the cataract surgery unit and takes them to the hospital exit, saving approximately 15 minutes of nursing time per patient.
- *Chart preparation:* A ward clerk saves nursing time by preparing charts. Preparation of charts several days in advance minimizes last-minute problems during the busy morning period.
- *Lenses:* Lenses are picked, labelled and placed in the operating room in the correct order the day before surgery.
- *Routine preoperative investigations:* The move to topical anesthesia allowed a policy change eliminating routine preoperative physical examinations and laboratory investigation. As this policy change also eliminated the preoperative visit, elderly patients no longer had to make two hospital visits.
- *Eye program stretcher:* Acquisition of dedicated eye program stretchers eliminated the stretcher shortages that had previously plagued the eye program. Patients remain on the same eye stretcher from the perioperative holding area to recovery, minimizing patient moves and saving time. Once the patient moves to a chair, the stretcher circulates back to the perioperative area to be readied for the next patient.
- *Customized procedure packs:* The surgeons standardized the cataract surgery procedure and instrument sets, allowing creation of standard customized surgery packs and reducing the number of packs the nurse had to open for each case. Each pack

also contains a separate tray of emergency vitrectomy instruments under the cataract surgery tray.

- *Case cart system:* The nurse places all required instrument and gown packs for each case on a cart outside the operating room, with the carts placed in order of scheduled cases. At the conclusion of a case, one cart is simply wheeled out and the next one wheeled in.
- *Standard eyedrop kit:* The surgeons standardized preoperative eyedrops, allowing the pharmacy to prepare a standardized eyedrop kit.
- *Cataract surgery forms:* Staff redesigned a uniform set of preoperative, intraoperative and postoperative record forms to meet the needs of the program. The forms incorporated timesaving features, such as boxes that could be ticked, replacing written responses.
- *Nurse roles:* Within the operating room, three nurses fill interchangeable roles: preoperative assessment, circulating and scrub nurse. This approach is synchronized and focused; it uses nurses efficiently, increases teamwork and reduces turnover time.
- *Disposable injectors:* The scrub nurse loads the IOLs into disposable injectors, preparing the lens for the surgeon to implant. The use of disposable injectors minimizes instrument cleaning requirements.
- *Instrument processing:* A dedicated instrument preparation room adjoins the cataract surgery operating room. Processing technicians clean, repack and sterilize instruments after each block of cases. This just-in-time system both minimizes the stock of instruments and ensures the availability of adequate sterile packs for all procedures.
- *Housekeeping:* Using double sets of linen and garbage containers allows full containers to be wheeled out and replaced by clean ones as necessary. Spot cleaning between procedures in the operating room reduces housekeeping time but maintains the Operating Room Nurse of Canada standard.

6

Efficiency improvements increased the number of procedures performed and reduced waiting times for cataract surgery without increasing resource use. The waiting time for cataract surgery at Hôtel-Dieu Grace Hospital is currently three to four weeks. Furthermore, between 30% and 40% of the caseload is referred from outside the Windsor and Essex County area.

The increased volume of procedures reduced the operating room and staff cost per case (Taylor and Tremblay 1998). The increased volume of cases and the degree of standardization produced cost savings from volume discounts and decreased resource use. Overall costs were also lowered by eliminating the preadmission clinic visit, routine preoperative investigations, recovery room use, general anesthesia and the hospital stay, and by reducing the use of medications and equipment, such as blades and sutures.

Increased efficiency reduced hospital time for patients. Patient satisfaction surveys revealed that nursing care and efficiency and operating room process and procedure were excellent 90% of the time and satisfactory 10% of the time. The Hôtel-Dieu Grace Hospital cataract surgery program has served as a model for other eye programs. Teams of ophthalmic surgeons and nurses who have viewed the process in place at our institution have adopted all or part of it in their own institutions or clinics.

An independent healthcare consulting company, which has been involved in benchmarking different surgical procedures, determined that the total case duration at Hôtel-Dieu Grace Hospital, 13.98 minutes, exceeds the 90th percentile (14 minutes) for the national hospital comparison group (Sullivan Healthcare Consulting Canada Co. 2005).

## LESSONS LEARNED

Given the high rate of cataract surgery in Canada and current waiting lists, broad-based improvements in program efficiency could have an important impact on waiting lists. Several lessons can be drawn from this case.

- *Enlist the cooperation of the hospital administration.*

The staff found the administration strongly supported our efforts to increase the efficiency of our cataract surgery program. This support was instrumental to a successful outcome of our work. At the same time, it is important that decisions about changes to the eye program be made by the program team.
- *Create a cross-disciplinary cataract surgery team to act as change agents.*

The input of all disciplines is necessary to uncover inefficiencies in each step of the process. The involvement of multiple disciplines makes change a team process, and the appointment of a leader to drive the process makes change happen.
- *Adopt technology that reduces surgical time.*

More rapid and advanced technology is an essential part of improving surgical efficiency. Our program uses the Bausch & Lomb Millennium microsurgical system, the most efficient continuous vacuum system available, which allows us to reduce operative time maximally. Furthermore, the system is entirely modular, and a complete set of back-up modules is available close to the operating room. Should a problem develop with any module, a new one can simply and quickly be snapped into place. Foldable lenses, disposable lens injectors, topical anesthesia and the sutureless clear corneal surgical technique are all critical to surgical efficiency.
- *Assess every aspect of the patient experience for inefficiency.*

To identify all areas where improvements can be made, it is essential to review everything affecting patient flow, literally from the time the patient arrives at the door until the patient leaves the hospital after the procedure.
- *Eliminate bottlenecks in patient flow.*

This step is vital to improving efficiency. Bottlenecks are common when cataract surgery is managed as part of a general day surgery program. The optimal way of eliminating these bottlenecks is by creating a dedicated cataract surgery program.
- *Standardize tools and procedures to substantially improve efficiency.*

Our program standardized surgical packs and anesthetic procedures, preoperative patient assessment and preparation, recovery procedures, and postoperative instructions and discharge procedures. Standardization reduced duplication of effort, facilitated staff education and simplified the in-service program.
- *Institute regular in-service programs to support efficient operating room function.*

Bausch & Lomb provides regular in-service programs for staff moving to the program to ensure that all new personnel can move smoothly into their roles.
- *Create a dedicated and self-contained cataract surgery unit to maximize efficiency.*

The relatively compact space occupied by the cataract surgery program within the

hospital minimizes wasted steps and saves time moving patients to and from the operating room.

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8

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