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Factors influencing waiting times for elective laparoscopic cholecystectomy

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Introduction: Health Canada states that waiting list information and management systems in Canada are woefully inadequate, especially for elective surgical procedures. Understanding the reasons for waiting is paramount to achieving fairness and equity. The objective of this study was to examine the impact of demographic and clinical factors and surgeon volume on waiting times for laparoscopic cholecystectomy (LC). **Methods:** We comprehensively applied a wait-list database for all surgical procedures across a division of general surgery and performed a chart review of all patients undergoing LC in 2002 to collect additional demographic and clinical data. We excluded patients undergoing LC on an emergent basis or as a secondary procedure. For each patient, we calculated 2 time intervals: time from the receipt of consult to the surgical consult (interval A) and time from the surgical consult to the LC (interval B). Surgeons were categorized a priori into low- and high-volume groups, based on the median number of procedures they had performed. All analyses examining waiting times were performed with nonparametric methods. **Results:** The study cohort included 294 patients; most (94.6%) underwent LC for biliary colic. The median waiting times for interval A and interval B were 22 days and 50 days, respectively. No associations were identified between any of the examined waiting times, sex, diagnosis or Charlston Comorbidity Index. High surgeon volume was associated with longer waiting times for interval A (median 26 v. 19 d; $p = 0.04$) and interval B (median 58 v. 35 d; $p = 0.003$) and was also associated with a greater number of episodes of biliary colic (2.7 v. 2.0; $p = 0.03$). **Conclusion:** There is significant variability in specific waiting times for LC, which appears to be associated with surgeon volume. Better prioritization of patients undergoing nonemergent LC is required to improve patient care.

Introduction : Santé Canada affirme que les systèmes de gestion des listes d'attente et d'information en la matière sont d'une insuffisance désolante au Canada, en particulier dans le cas des interventions chirurgicales électives. Il est primordial de comprendre les causes des attentes si l'on veut instaurer la justice et l'équité. Cette étude visait à analyser l'impact de facteurs démographiques et cliniques et du nombre d'interventions pratiquées par les chirurgiens sur les temps d'attente dans le cas de la cholécystectomie par laparoscopie (CL). **Méthodes :** Nous avons appliqué de façon détaillée une base de données sur les listes d'attente à toutes les interventions chirurgicales dans une division de la chirurgie générale et analysé les dossiers de tous les patients qui ont subi une CL en 2002 afin de réunir des données démographiques et cliniques supplémentaires. Nous avons exclu les patients qui ont subi une CL d'urgence ou comme intervention secondaire. Pour chaque patient, nous avons calculé deux intervalles : le temps écoulé entre la réception de la demande de consultation et la consultation avec le chirurgien (intervalle A) et le temps écoulé entre la consultation avec le chirurgien et la CL (intervalle B). On a classé les chirurgiens a priori en groupes à faible volume et à volume élevé compte tenu du nombre médian d'interventions qu'ils avaient pratiquées. Toutes les analyses portant sur les temps d'attente ont été réalisées par des méthodes non paramétriques. **Résultats :** La cohorte de l'étude incluait 294 patients dont la plupart (94,6 %) ont subi une CL à cause d'une colique biliaire. Les temps d'attente médians se sont établis à 22 jours et 50 jours respectivement pour l'intervalle A et l'intervalle B. On n'a établi aucun lien entre les temps d'attente analysés, le sexe, le diagnostic ou l'indice de comorbidité de Charlston. On en a établi un lien entre le nombre élevé d'interventions pratiquées par les chirurgiens et des périodes d'attente plus longues pour l'intervalle A (médiane, 26 c. 19 j; $p = 0,04$) et pour l'intervalle B (médiane, 58 c. 35 j; $p = 0,003$), ainsi qu'avec un nombre plus élevé d'épisodes de colique biliaire (2,7 c. 2,0; $p = 0,03$). **Conclusion :** Les temps d'attente particuliers à la CL, qui semblent liés au nombre des interventions pratiquées par les chirurgiens, sont très variables. Il faut améliorer l'attribution des priorités aux patients qui subissent une CL non urgente si l'on veut améliorer le soin des patients.

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Waiting for elective surgical procedures is a reality of health care in Canada and in many other countries with publicly funded health care systems. A core objective of any publicly funded health care system is to provide medical interventions to people who will benefit, with those in greatest need being served first. The public expects equality, and the Canada Health Act enforces this expectation. However, recent studies on the state of the Canadian health care system have shown a decline in approval during the 1990s,[1] implicating claims of increasing waiting times for procedures and consultations with specialists. A recent Canadian Medical Association (CMA) poll suggested that waiting times had increased, making it more difficult to access specialists.[2] This perception has led to a growing awareness of a need for research examining waiting times and the factors affecting them.

A recent report for Health Canada has found that wait-list information and management is inadequate, particularly for elective procedures.[3] The reasons for waiting are paramount to understanding the wait-list dilemma and to procuring an equitable solution. Several studies have been performed to help elucidate these factors.[4–6] Unfortunately, many such studies were restricted to particular subspecialty procedures, such as joint arthroplasty and cardiac bypass surgery. These studies have found a wide variety of factors associated with waiting times, including the particular surgeon; patients' age, sex, and ethnicity; and various clinical factors.[4] Other studies have reported that surgeon volume accounts for the variation in waiting time for procedures.[7] A paucity of Canadian data examines the impact of other demographic or clinical factors on waiting for common procedures performed by general surgeons.

Thus, the objective of this study was to examine the impact of demographic, clinical and surgeon factors on waiting times for laparoscopic cholecystectomy (LC)—a common general surgical procedure.

Methods

We comprehensively analyzed a wait-list database across a division of general surgery at the Queen Elizabeth II Health Sciences Centre in Halifax, Nova Scotia, for all surgical procedures performed from Jan. 1, 2002 to Dec. 31, 2002. A data collection form comprised each patient's identification, surgeon, date of receipt of referral, date of surgeon consultation, date of surgery and type of surgical procedure. Completion of this form was a requirement for booking the operative procedure; no case was booked without the completion of all data fields.

We selected all patients undergoing elective LC from this database and performed a retrospective chart review to collect additional demographic and clinical data. Data recorded from the chart review included the following: age, sex, geographic residence, indication for LC surgery, number of episodes of biliary colic, number of emergency department visits attributable to biliary colic and Charlston Comorbidity Index. The Charlston Comorbidity Index has been validated as a tool to measure comorbidities in a chart review setting.[8] Surgeons were categorized a priori into low- and high-volume groups based on the median number of LC procedures performed.

We excluded patients if they had incomplete data in the database or the chart review (19 patients) and if they were undergoing LC as a secondary procedure (e.g., right hepatic lobectomy; 15 patients).

Data collection from the wait-list database allowed for the calculation of 2 waiting time intervals: the number of days from receipt of the referral in the surgeon's office to the date of surgical consult (interval A) and the number of days from the office visit to the date of surgery (interval B).

Geographical residence was categorized as urban and rural, based on whether the patient resided within the Halifax Regional Municipality.

We performed all univariate factor analyses associated with time intervals, using nonparametric methods (Mann–Whitney *U* test or Kruskal–Wallis test), given the nonnormal distribution of the time data. We used chi-square tests to examine differences among categorical variables. To control for potential confounding variables and to determine factors independently associated with time interval A and B, we performed a multivariate analysis by linear regression, using a forward stepwise approach. All variables examined on univariate analysis were considered. To satisfy the general assumptions of linear regression, we developed the model, using the natural logarithm of time interval as the dependent variable; separate models were constructed for both time intervals. Statistical significance was set at $p = 0.05$.

Results

We included 294 patients in the study cohort, with a mean age of 46.1 years. Of these, 241 (82%) were women. In most patients (71.1%), the geographical residence was urban. The indication for LC was calculous bilary colic in 278 (94.6%) patients. Based on an a priori plan for categorization (see Methods), surgeon dichotomization around the median number of patients resulted in 136 patients of low-volume surgeons (6 surgeons) and 158 patients of surgeons with a high volume of patients (3 surgeons).

The median time for interval A (surgical consult request to actual consult) was 22 days, and the median time for interval B (surgical consult to operation) was 50 days. Surgery was postponed in 31 patients (10.5%); among these, the most common reason was patient request (21 patients, 67.7%).

Among demographic factors, patient sex, geographical location (urban v. rural) and indication for LC (calculous biliary colic v. other) were not associated with any differences in interval A or B (Table 1). Similarly, no significant associations were identified between the number of episodes of bilary colic, Charlston Comorbidity Index or the number of emergency department visits and either interval A or B. However, the time from surgical consult to surgery (interval B) was significantly longer in patients aged 50 years and over (Table 1).

We noted significant variability in both intervals between individual surgeons (p = 0.003 and p = 0.001, respectively; see Fig. 1). When this was examined according to the low- and high-volume surgeon groups, significantly longer intervals A and B were found among patients of high-volume surgeons (Table 1).

We identified no significant differences in patient age, sex, geographical location, indication for LC, Charlston Comorbidity Index or number of pre-LC emergency department visits to biliary tract disease between high- and low-volume surgeons. However, the mean number of episodes of biliary colic was significantly higher among patients of high-volume, compared with low-volume, surgeons (2.7 v. 1.9; p = 0.03).

On multivariate analysis, only high surgeon volume (p = 0.04) was associated with the natural logarithm of interval A, whereas both older age (≥ 50 years; p = 0.001) and high surgeon volume (p = 0.02) were associated with the natural logarithm of interval B.

Discussion

We undertook this study to examine the impact of various clinical and demographic factors on waiting time for elective LC. It provides evidence that there is variability in waiting that is not attributable to patient demographics or clinical factors. The individual surgeon and, specifically, his or her volume of LC patients impacted the length of both intervals examined, with higher volume surgeons having longer wait times.

In assessing these factors, the waiting time was defined in terms of the number of days from the receipt of referral in the surgeon's office to the surgeon consultation (interval A) and from the initial consultation with the surgeon to the date of surgery (interval B). In 266 (90.5%) patients, the decision for surgery was made on the date of the initial consultation. When we repeated the analyses, defining interval B as the time from the decision for surgery to the actual surgery, no substantive changes to the study findings resulted.

In this study, we used a median time in days because it eliminates data being skewed by a small number of patients with long waits (invariably present in studies on waiting time). The use of mean waiting

Table 1

Associations between demographic and clinical factors and specific time intervals, (n = 294)

		Interval A		Interval B	
Factor	No. patients	Median, days	p value*	Median, days	p value*
Age			0.11		< 0.001
< 50	187	21		41	
≥ 50	107	25		64	
Sex			0.26		0.28
Men	53	27		43	
Women	241	22		51	
Geographic residence			0.99		0.68
Urban	209	23		50	
Rural	85	22		50	
Indication for LC			0.24		0.73
Calculous biliary colic	278	23		50	
Other	16	16		55	
Surgeon volume			0.04		0.003
Low	136	19		41	
High	158	26		64	

LC = laparoscopic cholecystectomy
*compares interval length for various factors.

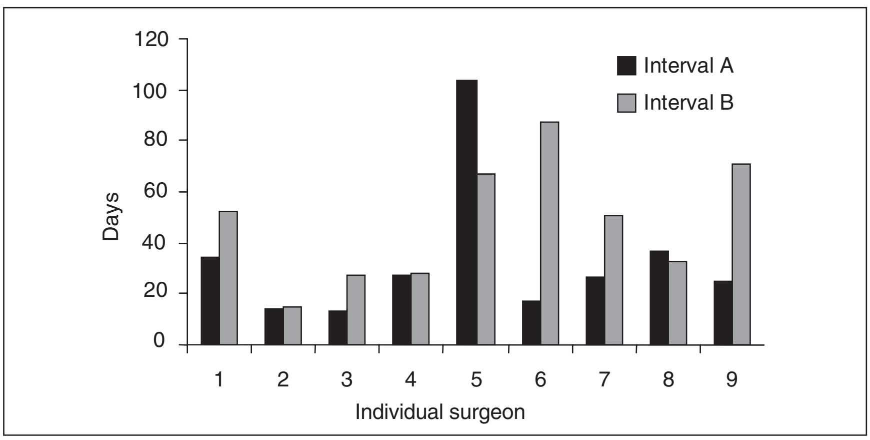

FIG. 1. Comparison of surgeons' median time from initial consult to surgical consult (interval A) and surgical consult to surgery (interval B). Significant variability among individual surgeons was identified for both interval A (p = 0.003) and interval B (p = 0.001).

times can be misleading, since the waiting time distribution is not a normal distribution.

Some of our findings were similar to other studies on waiting times. Clover and colleagues[4] showed that waiting time for surgery was not related to a patient's age, sex, country of birth, education or marital status. Further, Kelly and others[7] provided evidence that age, sex, education and work status did not impact waiting time for joint arthroplasty. We found only an association between age 50 years and over and increased time from surgical consult to surgery. This could be attributable to a greater need for preoperative investigations and/or consultations in the older patient population.

We found significant variability among individual surgeons for both waiting times examined in this study. There are several plausible explanations for this. Individual surgeons may have variations in available operating room (OR) time, with consequent variability in OR access for their patients. If operative times were equally allocated to all surgeons, as was the case in this study, overall patient load would likely impact waiting lists. Individual surgeons' practice patterns may differ, so that one surgeon might perform LC procedures many times during the week, while another might perform them a few times a month. The acuity of the non-LC cases in an individual surgeons' practice likely also varies. Similar to this study, Naylor and colleagues[9] showed that a particular surgeon was associated with a longer waiting time for coronary artery bypass surgery.

In further examining surgeon-related variability on waiting time, results from this study indicate that patients who had LC performed by a surgeon with a high volume of LC patients waited longer both to see the surgeon and to have their operation. This is in line with Kelly and colleagues,[7] who reported that patients undergoing hip or knee arthroplasty waited, on average, twice as long for a joint replacement if their procedure was performed by a surgeon with a higher volume of arthroplasty procedures. These authors suggested that the variability could be explained by the trend that subjects in the lower volume group were more likely to undergo knee replacement instead of hip replacement, and they had fewer comorbid conditions, suggesting a less complicated patient population and thus a shorter waiting time. Such an explanation, however, does not apply in this study.

Further examination for significant differences in our high- and low-volume groups reveals only one difference: the high-volume group appeared to have a significantly higher number of episodes of biliary colic preoperatively, compared with patients of lower volume surgery. It is unclear whether this suggests that the higher volume group is a more complicated patient population; it may simply suggest that patients who wait longer are more likely to have more episodes of biliary colic. There were no significant differences in Charlston Comorbidity Index scores between the groups; thus, it appears that the longer wait could not be attributed to greater comorbidity-related delays among the patients of higher volume surgeons.

Sanmartin and others[1] state that solving the wait-list inequities requires reducing demand, prioritizing patients and reorganizing patterns of care. Demand reduction can be achieved by wait-list audits. For example, approximately 20%–40% of patients were inappropriately queued for some procedures (if a patient died or no longer required surgery).[1,10–13] Prioritizing patients and reorganizing patterns of care can be achieved by coordinating wait-lists. Individual surgeons presently manage wait-lists, but coordinating these across a department or region could allow for a more efficient and equitable solution to the variability in waiting time. Centralizing the wait-lists of individual surgeons would reduce the variability inherent in individual wait-lists and could potentially share the patient load among surgeons, if appropriate. Canadian experiences with coordinated lists, for example, the Ontario Cardiac Care Network and a similar program at the Montréal-Centre Régie Régional, have had favourable results.[1,14] These coordinated lists appear to provide more openness and transparency in managing wait-lists.

There are several limitations to this study. We obtained the data from a single region and studied 1 surgical procedure; thus they may not be generalizable to other procedures or surgeon groups. The data eliminated all patients who had an emergency LC performed, regardless of whether he or she had been on the wait-list previously. This eliminated many patients who might have been on a wait-list, potentially resulting in an incomplete representation of all available patients. Further, the retrospective chart review and database were limited in their ability to capture information on other variables that may be pertinent to determining wait-time. For example, socioeconomic status and employment type/status could not be reliably ascertained with the methodology used in this study.

In this analysis, we examined only one surgeon variable—surgeon's LC volume. It is possible, and perhaps likely, that other surgeon factors, such as overall volume, scope of practice and speed in the OR, are associated with wait times. Although we are not able to draw conclusions regarding any of these other unmeasured surgeon factors, the underlying message of variability among surgeons is clear.

This study emphasizes the need for further research on the use and applicability of wait-list management systems, specifically, publicly accessible lists that allow equal access to elective surgical procedures. There is also a need to develop a means to reliably triage patients to waiting lists on the basis of clinical need. Projects such as the Western Canada Waiting List Project[15] are attempting to address this need. The development of triage protocols that are reliable and reproducible may enhance the ability of Canadian health systems to provide service in an efficacious and equitable manner.

In conclusion, we found that waiting time for LC may be influenced by the particular surgeon and by how many LC procedures a surgeon performs. With the exception of age, demographic and clinical factors did not appear to impact on waiting times. This study provides further evidence of the disparity and inequity in wait-list management in current Canadian physician-based wait-lists.

Competing interests: None declared.

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