A retrospective population-based analysis of wait times for cataract surgery in Ontario, Canada

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Abstract

Background: Current methods used to estimate surgical wait times in Ontario may be subject to inconsistencies and inaccuracies. In this population-level study, we aimed to estimate cataract surgery wait times in Ontario using a novel, objective and data-driven method.

Methods: We identified adults who underwent cataract surgery between 2005 and 2019 in Ontario, using administrative records. Wait time 1 represented the number of days from referral to initial visit with the surgeon, and wait time 2 represented the number of days from the decision for surgery until the first eye surgery date. In the primary analysis, a ranking method prioritized referrals from optometrists, followed by ophthalmologists and family physicians.

Results: The cohort consisted of 1 138 532 people with mostly female patients (57.4%) and those aged 65 years and older (79.0%). In the primary analysis, the median was 67 days for wait time 1 (interquartile range [IQR] 29–147). There was a median of 77 days for wait time 2 (IQR 37–155). Overall, the following proportions of patients waited less than 3, 6 and 12 months: 54.1%, 78.5% and 91.7%, respectively. For wait time 2, the proportions of patients who waited less than 3, 6 and 12 months were 49.5%, 77.1% and 93.3%, respectively. In total, 19.3% of patients did not meet the provincial target for wait time 1, 20.5% did not meet the target for wait time 2 and 35.0% did not meet the target for wait times 1 or 2.

Interpretation: Administrative health services data can be used to estimate cataract surgery wait times. With this method, 35.0% of patients in 2005–2019 did not receive initial consultation or surgery within the provincial wait time target.

Cataract surgery is one of the most commonly performed surgeries in Canada and is expected to more than double in volume over the next 25 years.[1,2] In Ontario, Canada, there will be a 128% necessary increase in cataract surgical volumes over 25 years to meet population demand.[2] Current cataract surgery wait times are publicly available by way of the Wait Time Information System (WTIS).[3] Two wait times are disclosed: the time from initial referral to the first appointment with an ophthalmologist (i.e., wait time 1), and the time from the decision to pursue cataract surgery to the date of surgery (i.e., wait time 2).[3] Surgeons assign 1 of 4 priority levels that have corresponding surgical wait time targets (Appendix 1, available at www.cmajopen.ca/content/11/2/E329/suppl/DC1).[3] Most patients are designated as priority 4, meaning there is minimal risk of disease progression affecting morbidity. According to the WTIS, 82% (for wait time 1) and 59% (for wait time 2) of patients receive care within the provincial benchmark of 182 days, respectively.[3] Long wait times have been associated with substantial visual loss and an effect on quality of life.[4] Wait times on the WTIS are self-reported by surgeons. We believe that wait times are overestimated or underestimated

Appendix 3, available at www.cmajopen.ca/content/11/2/ E329/suppl/DC1, detail the baseline demographic information for the cohort. In general, more females (n = 651 890, 57.3%) and people aged 65 years and older (n = 898 926, 79.0%) underwent cataract surgery. Most patients (n = 869 724, 76.4%) had 2 or 3 potential referrals before surgery within the prespecified lookback window. Cataract surgeries occurred at a similar volume throughout the study period (Appendix 3).

The practitioner type for initial referral is provided in Table 2. In the primary analysis, optometrists saw patients preoperatively as the potential referral source in 78.8% of cases (n = 897 524). In the sensitivity analysis of the earliest potential referral, about one-third of patients saw an optometrist, and more than one-half saw a family physician. In the sensitivity analysis of the latest potential referral, more than one-half of patients saw an optometrist and more than one-third saw a family physician.

Primary analysis

In the primary analysis, the median wait time 1 using the referral source ranking method was 67 days (interquartile range [IQR] 29–147) (Figure 2). Overall, the following proportion of patients waited less than 3, 6 and 12 months: 54.1%, 78.5% and 91.7%, respectively. A total of 19.3% of patients did not meet the provincial target time of 182 days for wait time 1 using the same method. In the sensitivity analysis, there was a median of 173 days for wait time 1 (IQR 67–397) when using the earliest possible referral method to the maximum of 3 years between referral and initial consultation with the cataract surgeon. This was in contrast to a wait time 1 of 49 days (IQR 21–104) when using the latest possible referral within the same lookback window.

There was a median of 77 days for wait time 2 (IQR 37–155) with the referral source ranking method in the primary analysis. For wait time 2, the proportion of
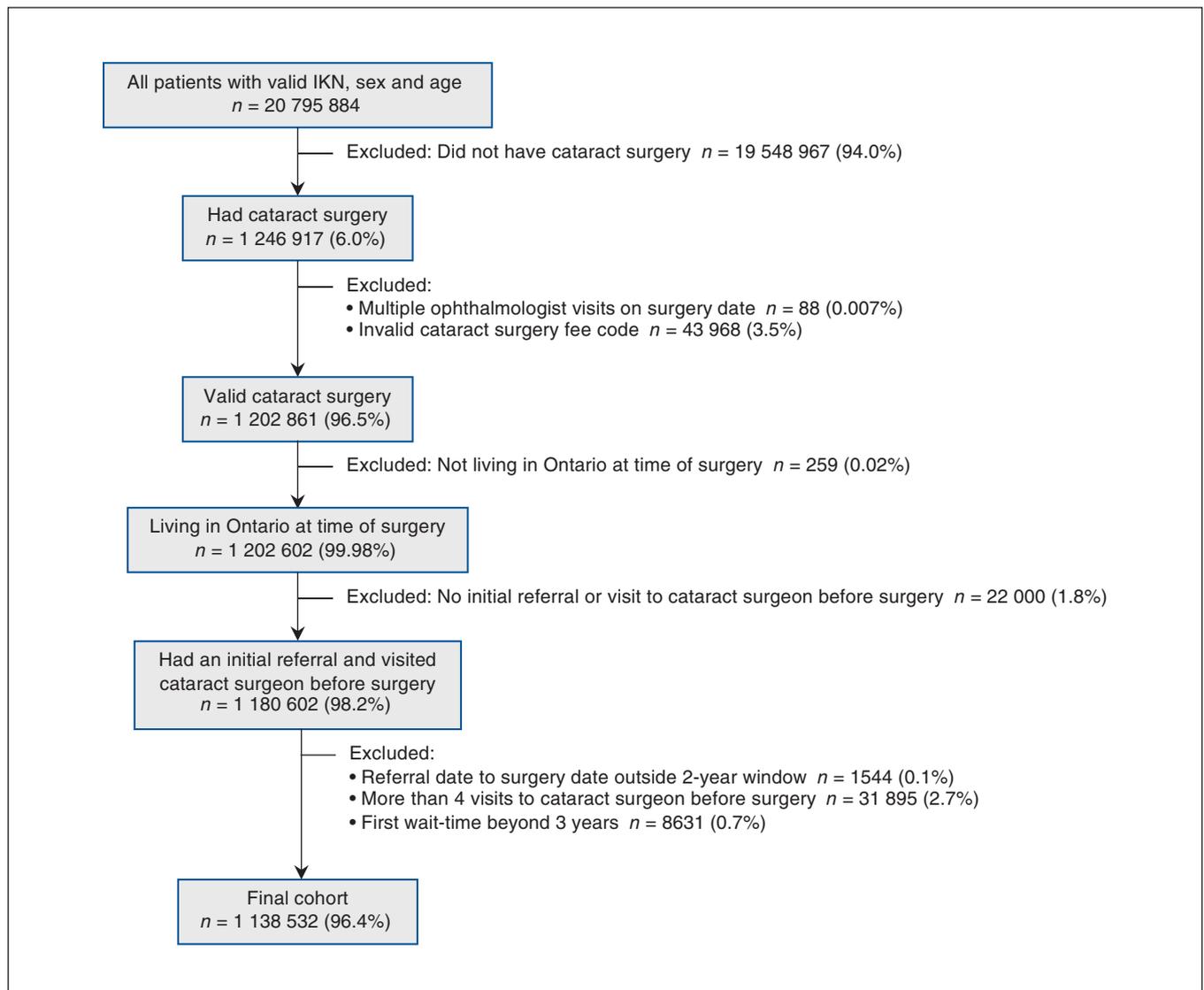

Figure 1: Consolidated Standards of Reporting Trials (CONSORT) flowchart for study selection. Note: IKN = ICES key number.

Table 1: Summary of baseline demographic characteristics and their distribution in the study cohort	
Characteristic	No. (%) of patients n = 1 138 532
Sex	
Female	651 890 (57.3)
Male	486 642 (42.7)
Location indicator	
Missing	985 (0.1)
Urban	988 768 (86.9)
Rural	148 779 (13.1)
Age at surgery date, yr	
18–39	5164 (0.4)
40–64	234 442 (20.6)
≥ 65	898 926 (78.9)
Institution type	
Missing	327 439 (28.8)
Hospital	517 511 (45.5)
Ambulatory care centre	270 648 (23.8)
Other	22 934 (2.0)
Potential optometrist referral	
Yes	89 524 (78.8)
Potential ophthalmologist referral	
Yes	315 416 (27.7)
Potential family physician referral	
Yes	967 983 (85.0)

Table 2: Source of initial referral stratified by analysis type	
Analysis type	No. (%) of patients n = 1 138 532
Primary analysis: priority ranking	
Optometrist	897 524 (78.8)
Ophthalmologist	117 659 (10.3)
Family physician	123 349 (10.8)
Sensitivity analysis: earliest potential referral	
Optometrist	386 423 (33.9)
Ophthalmologist	144 099 (12.7)
Family physician	608 010 (53.4)
Sensitivity analysis: latest potential referral	
Optometrist	580 371 (51.0)
Ophthalmologist	144 044 (12.7)
Family physician	414 117 (36.4)

patients who waited less than 3, 6 and 12 months were 49.5%, 77.1% and 93.3%, respectively. With this method, 20.5% of surgeries did not meet the provincial wait time target.
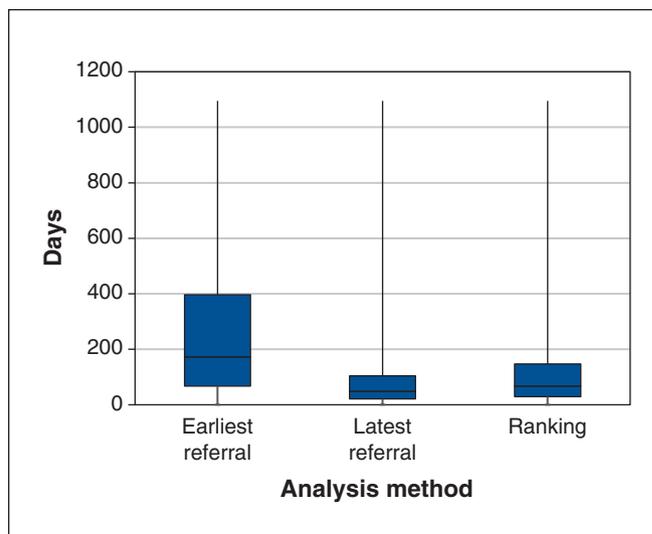
Figure 2: Distribution of time from initial referral to initial consultation with a cataract surgeon (wait time 1) in the primary analysis.

Secondary analysis: referral source

When the analysis was stratified by referral source, there was a median of 65 days for wait time 1 (IQR 30–138) for patients seen by an optometrist, 93 days (IQR 33–300) for patients seen by an ophthalmologist and 144 days (IQR 47–341) for patients seen by a family physician (Figure 3A). The median was 77 days for wait time 2 (IQR 38–154) for patients seen by an optometrist, 76 days (IQR 36–169) for patients seen by an ophthalmologist and 69 days (IQR 34–140) for patients seen by a family physician (Figure 3B).

Subgroup analysis: single eligible referral

After restricting the analysis to patients with a single eligible referral, the median was 68 days for wait time 1 (IQR 28–152). The median was 74 days for wait time 2 (IQR 36–149).

Subgroup analysis: multiple eligible referrals

When restricting the analysis to consider only patients with multiple eligible referrals, the median was 67 days for wait time 1 (IQR 30–146) for the ranking method, which contrasted with 227 days (IQR 97–474) when the earliest potential referral was considered, and 45 days (IQR 20–92) when considering the latest potential referral (Figure 3C). The median was 78 days for wait time 2 (IQR 38–158) using the ranking method, which was in line with the results when the earliest potential referral (median 86 d, IQR 43–183) or latest potential referral (median 61 d, IQR 30–120) were considered (Figure 3D).

Subgroup analysis: age

Using the ranking method, the median for patients aged 20–64 years was slightly shorter relative to those aged 65 years and older (wait time 1: 65 d v. 68 d; wait time 2: 68 d v. 79 d).

Figure 3: (A) Distribution of time from initial referral to initial consultation with cataract surgeon (wait time 1) stratified by referral source. (B) Distribution of time from initial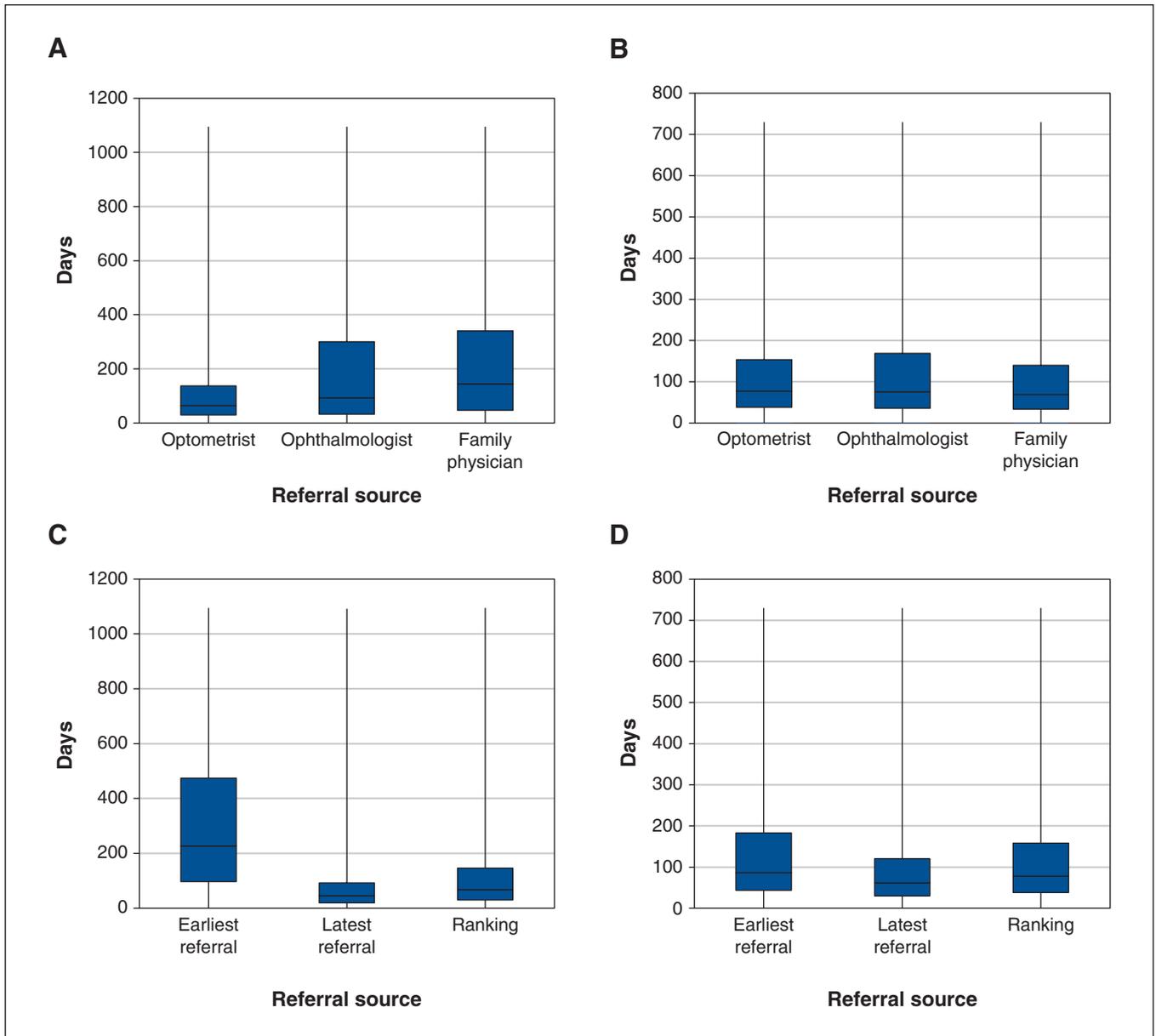 consultation with cataract surgeon to cataract surgery (wait time 2) stratified by referral source. (C) Distribution of time from initial referral to initial consultation with cataract surgeon (wait time 1) restricted to patients with multiple referral sources. (D) Distribution of time from initial consultation with cataract surgeon to cataract surgery (wait time 2) restricted to patients with multiple referral sources. Note: The box represents the interquartile range and the whisker plot shows whiskers extending to the minimum and maximum wait times.

Time trend analysis

The highest proportion of patients not meeting provincial wait time targets for wait times 1 and 2 were seen in 2005 and 2017–2019, based on the date of surgery (Figure 4). The lowest proportion was observed from 2008 to 2013.

Interpretation

In this analysis, the wait times from initial referral to first consultation (wait time 1) and from first consultation to cataract surgery (wait time 2) were investigated for more than 1 million patients in Ontario, Canada. In the primary analysis, there was significant variability in wait time 1 (median 67 d), depending on what method was used to identify the initial referral date. For wait time 2, the medians were similar across the methods used, and the results showed a median of 2 to 3 months. A high proportion (35.0%) of cataract patients receiving surgery between 2005 and 2019 did not meet the priority 4 provincial wait time target for either wait times 1 or 2.

When compared with data from the Canadian Institute for Health Information (CIHI), our median of 92 days (wait time 2) was longer than the reported CIHI data (63 d) from April to September 2019.[5] Canadian Institute for Health Information wait times are derived from WTIS data of only 94
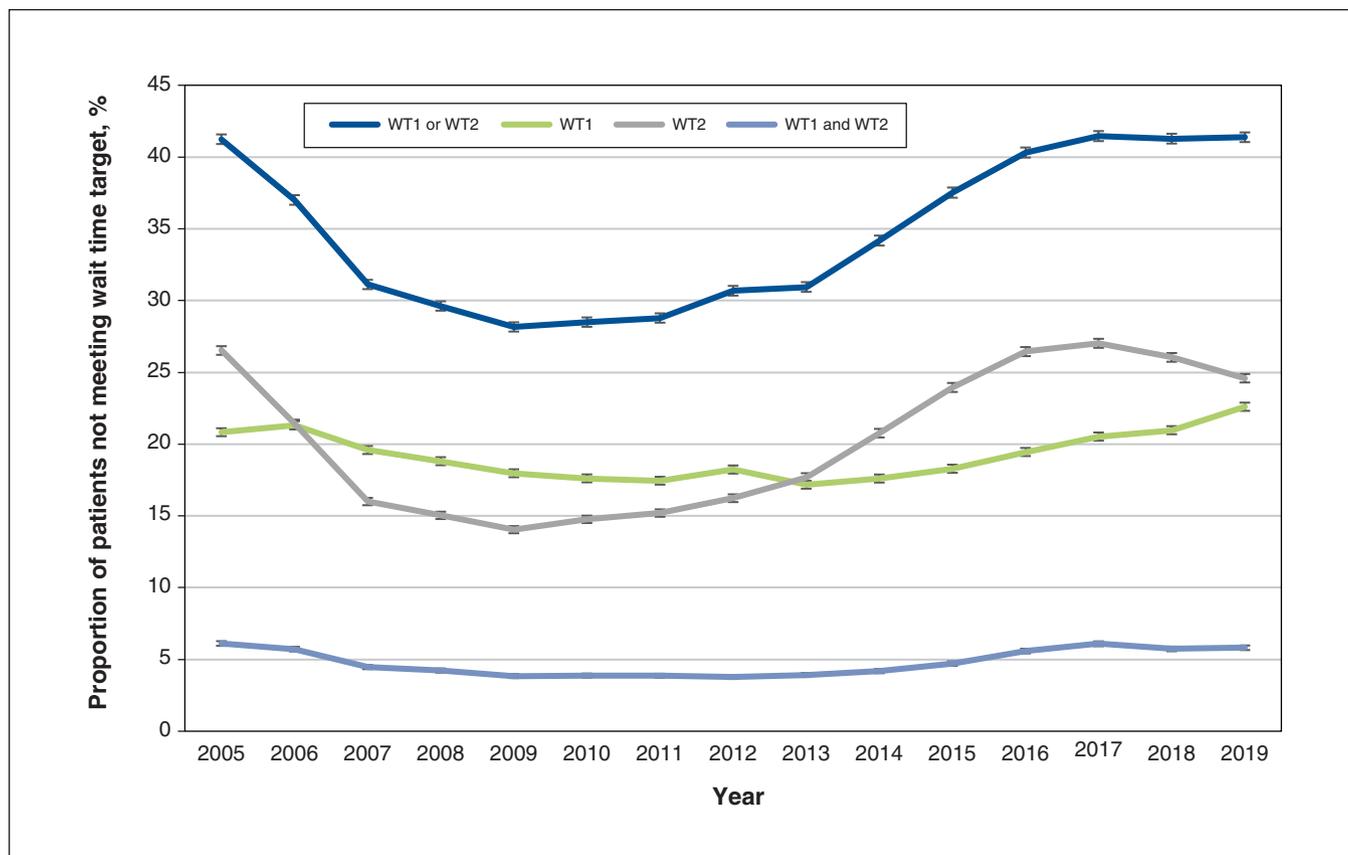
Figure 4: Time trend analysis of the proportion of patients not meeting provincial wait time targets from 2005 to 2019. Note: WT1 = wait time 1; WT2 = wait time 2. Error bars represent 95% confidence intervals.

Ontario hospitals that perform adult surgery, effectively representing a subset of Ontario cataract surgeries.[7] We also believe that current self-reported wait time data submitted to CIHI may not be accurate, and may be underestimating the actual wait times for cataract surgery.

The use of a large health administrative database for documentation of cataract surgical wait times has multiple advantages. By using an objective, data-driven, standardized methodology, policy-makers can appreciate regional differences in cataract surgical wait times, which would allow for further allocation of surgical cases to centres most in need. In addition, wait times from the administrative database can be scrutinized over time. Important uncertainty estimations can be provided in the analysis of administrative data, such as a sensitivity analysis using the latest and earliest referral date. A major conclusion of this analysis is that when using administrative data for tabulation of wait times, there is likely to be a higher degree of confidence with wait time 2 results observed relative to wait time 1.

Limitations

With the administrative databases used, there is no identifier for the date of referral, with sensitivity analyses based on differing assumptions about the referring provider used to recognize the uncertainty in these estimates. We acknowledge the possibility of misclassification of the referring physician, especially for people aged younger than 65 years who paid out of pocket for an optometrist evaluation and referral for cataract surgery. We did not consider referrals for cataract surgery that did not involve an optometrist, ophthalmologist or family physician, as well as patient referrals that were requested outside of a billable appointment by a referring provider. These other referrals likely represent a minority of cases, and only 1.8% of patients were excluded owing to not having an initial visit by at least 1 of these health care professionals or for not having a visit to the cataract surgeon before surgery (Figure 1). For this reason, we acknowledge that a potential advantage of self-reporting of wait times, as is currently done, is that a greater proportion of referrals are captured. For wait time 1, optometrists do not always report a billing code with a cataract diagnosis, and therefore other diagnostic optometrist codes were considered. Based on clinical experience, unique cases in which wait time 1 exceeded 3 years or wait time 2 exceeded 2 years were excluded in the analysis, though these were a minority of cases (0.9%, Figure 1). This method of data reporting would not be able to account for changes to surgeon behaviour in referral management in the setting of an incentivized system. For wait time 2, patients followed at baseline by a cataract surgeon had an unclear date of visually significant cataract diagnosis, thus affecting the accuracy of the observed wait time 2. Similarly,

factors that may influence wait time 2, such as preoperative anesthesia or subspecialist consultation, preoperative management of ocular comorbid-ities or patient hesitancy, could not be captured in the databases analyzed. These factors may lead to an overestimation of wait time 2. It is also important to mention that our study does not comment on the appropriateness of cataract surgery for included patients, and excludes patients with cata-racts who did not receive surgery.

Conclusion

The use of administrative health data to systematically calculate cataract surgery wait times represents a promising modality. In our analysis, 35.0% of cataract surgery patients in 2005–2019 did not receive initial ophthalmic consultation or surgery within the wait time target of 182 days when considering the ranking method. The method provided allows for regions to be identified and prioritized for further government funding based on long wait times, as well as an evaluation of predictors of wait times. These methods can be easily incorporated in the evaluation of wait times of other ambulatory surgeries. We believe that the reporting of wait time 2 is reproducible and accurate; however, there is an inherent uncertainty regarding wait time 1 owing to the inability to identify the date of referral. The creation of new billing codes made at the time of referral should be explored as this would improve the accuracy of wait time 1 estimates. In our efforts to characterize wait times, we hope to aid researchers and policy-makers in highlighting the access and disparities to cataract surgery care in Ontario.

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Data sharing: Data used in this analysis are not publicly available and were accessed by way of the ICES databases.

Supplemental information: For reviewer comments and the original submission of this manuscript, please see www.cmajopen.ca/content/11/2/E329/suppl/DC1.