

Why Stop at One When You Can Do Both? Preliminary Findings on the Environmental and Accessibility Benefits of Immediately Sequential Bilateral Cataract Surgery in Southern Alberta

Lynton, Zorana¹; Al-Ani, Abdullah^{1,2}; Rawlyk, Brooklyn^{1,2}; Kryshtalskyj, Michael^{1,2}; Carrell, Nathan³; Huang, Peter²; Huang, Paul^{1,2}
¹ Cumming School of Medicine, University of Calgary, Calgary, AB, Canada; ² Section of Ophthalmology, Department of Surgery, University of Calgary, Calgary, AB, Canada; ³ Clearfield Eye Physicians and Surgeons, Lethbridge, AB, Canada

Background

Cataract surgery is the most commonly performed surgical procedure in Canada, with demand projected to increase by over 20% in the next decade due to the aging population [1]. Notably, rural populations are aging faster than urban populations [2]. Given these trends, timely evaluation of cataract surgery accessibility in rural areas is essential to inform effective resource planning.

In Alberta, many rural communities are dispersed across vast geographical areas, making surgical service delivery particularly challenging. Here we share the preliminary results from a systematic evaluation of cataract surgery accessibility in southern Alberta.

Aims

1. Identify geographical disparities in access for cataract surgery [In progress]
2. Quantify carbon emissions associated with rural patient travel for cataract surgery
3. Propose solutions to improve accessibility

Methods

The location (city/town and postal code) of patients who receive phacoemulsification cataract surgery at the Holy Cross Surgical Center in Calgary (272 patients, 450 eyes) and the Chinook Regional Hospital in Lethbridge (296 patients, 517 eyes) between June 1, 2024 and January 30, 2025 were recorded and analyzed. This analysis forms part of an existing project designed to calculate efficiency, via CO₂ emissions, associated with cataract surgery using the EyeEfficiency tool [4]. This tool employs well-established carbon footprinting methods to estimate emissions from patient travel, among other sources, to quantify time, resource, and environmental inefficiencies.

This project received formal ethics exemption from the University of Calgary Conjoint Health Research Ethics Board.

References

1. The Conference Board of Canada, Ophthalmology in Canada, in Why Vision Loss Should Not Be Overlooked, N.M. Isabelle Gagnon-Arpin, Monika Slovynec D'Angelo, Zhenzhen Ye, Editor. 2020.
2. Channer, N.S., S. Biglieri, and M. Hartt, Aging in rural Canada, in Aging People, Aging Places: Experiences, Opportunities and Challenges of Growing Older in Canada, M. Hartt, et al., Editors. 2021, Bristol University Press. p. 141-148.
3. Froese, G., Two hospitals team up for better vision. Alberta Health Services.
4. Goel, H., et al., Improving productivity, costs and environmental impact in International Eye Health Services: using the 'EyeEfficiency' cataract surgical services auditing tool to assess the value of cataract surgical services. BMJ Open Ophthalmol, 2021. 6(1): p. e000642.
5. Malcolm, J., et al., Immediate sequential bilateral cataract surgery: patient perceptions and preferences. Eye (Lond), 2023. 37(7): p. 1509-1514.

Conflicts of Interest: None. Supported by The Calgary Eye Foundation Research Grant.

Preliminary Results

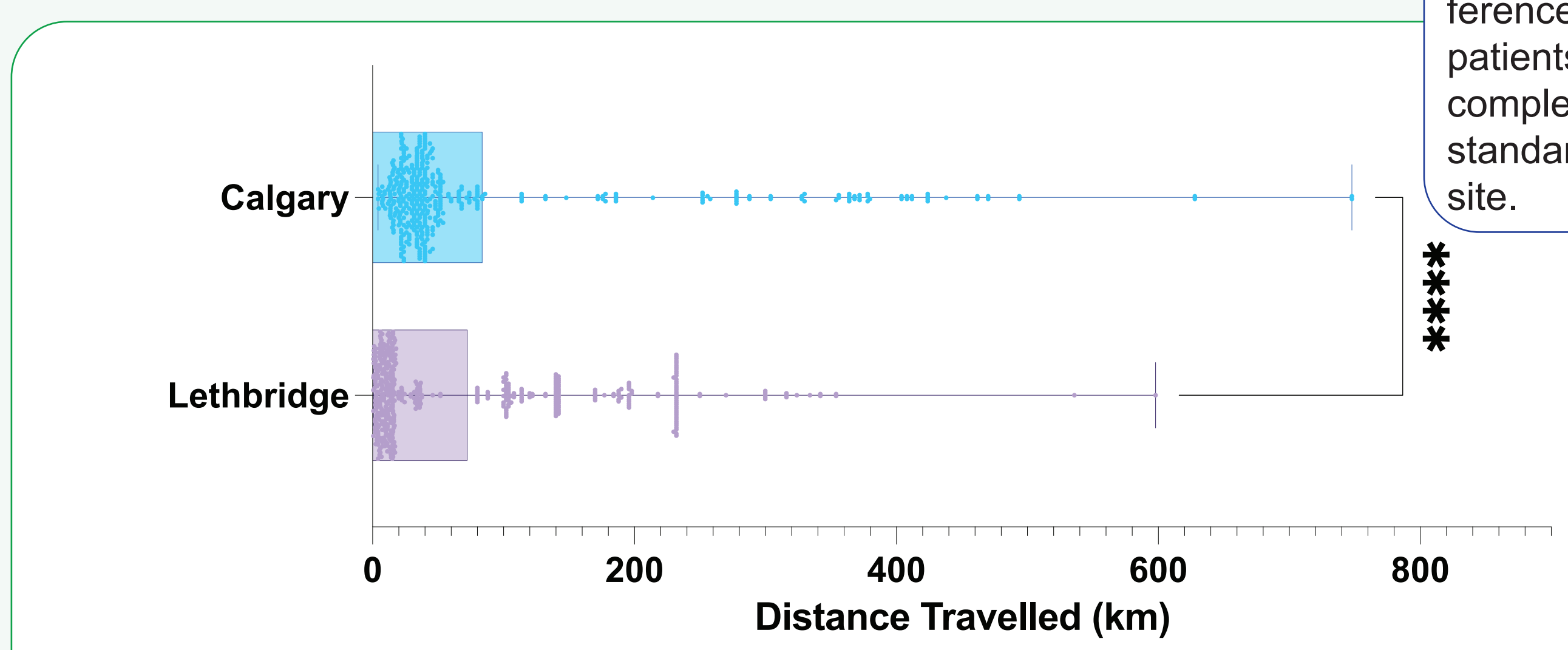


Figure 1. The average distance travelled, round-trip, to receive cataract surgery is significantly greater for patients travelling to/within Calgary (average 84.1km; n = 450 procedures) compared to patients travelling to/within Lethbridge (Mann-Whitney test p < 0.0001; average = 72.6km; n = 517 procedures).

Additional analyses

There was no significant difference between the distance patients travelled to receive a complex cataract versus a standard procedure at either site.



Patients travel significantly further, on average, to receive cataract surgery in Calgary compared to Lethbridge.

Offering immediately sequential bilateral cataract surgery to all patients would result in a 16.5% reduction in CO₂ emissions.



Rural patients who travel further to Calgary are more likely to opt for premium IOLs.

Preliminary significance

Rural patients with greater economic means may have better access to cataract surgery. Further investigation is required.

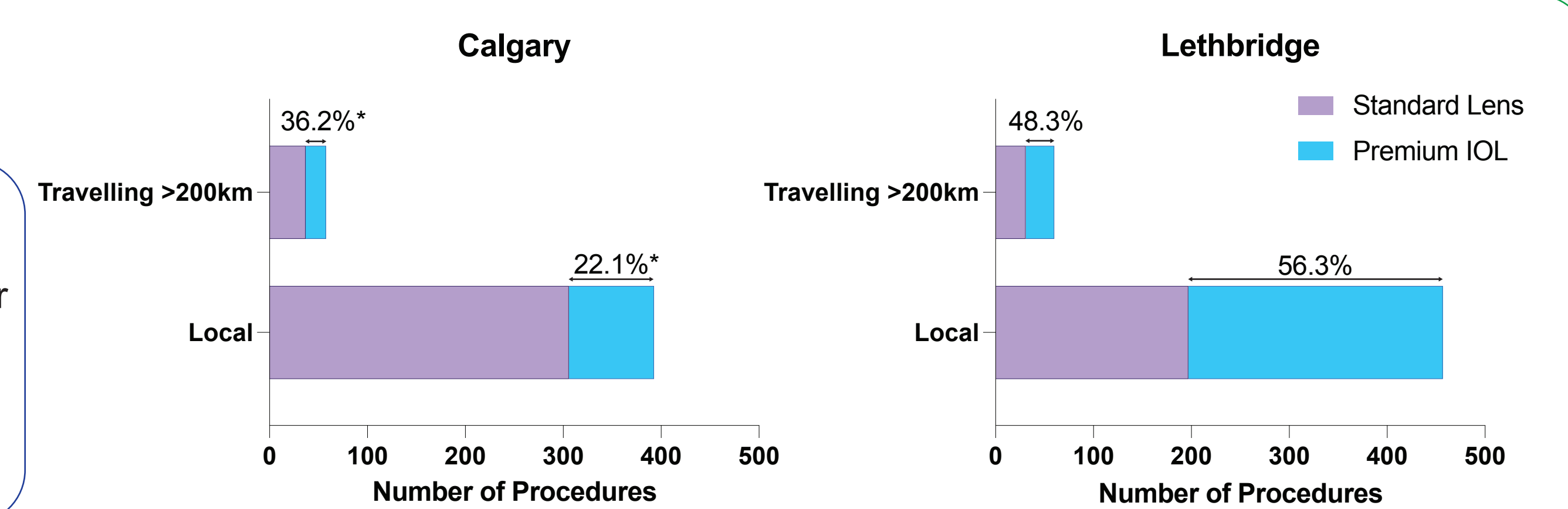


Figure 2. Contingency analyses showed patients who travel >200km round trip (n = 58 procedures) to receive cataract surgery in Calgary were more likely to opt for a premium intraocular lens (IOL) compared to local patients (n = 393 procedures; Fisher's exact test p = 0.03). There was no significant difference for Lethbridge patients (n = 457 local, n = 60 travelling >200km).

Limitations

- Assumed all travel occurred by personal petrol vehicle may not capture real-world variability.
- Patient decision-making factors (e.g., socioeconomic status, education) were not controlled for.
- Only two surgical centers analyzed, unlikely to truly represent southern Alberta.

Preliminary Conclusions

Routinely offering bilateral cataract surgery may substantially reduce CO₂ emissions and improve access for rural populations. Ongoing analysis will guide evidence-based planning for equitable and environmentally responsible surgical delivery for rural Southern Alberta.