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LETTER TO THE EDITOR

The Impact of Lions Outback Vision's Kimberley Hub on Cataract Surgery Rate and Wait Time in Rural Western Australia: An Interrupted Time Series Analysis

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Cataract disproportionately affects First Nations and rural Australians due to barriers in accessing surgical services. Lions Outback Vision (LOV), a division of the Lions Eye Institute, is the sole public ophthalmology provider in remote Western Australia. In 2020, a permanent ophthalmic service—the Kimberley Hub—was established in Broome. The Hub offers vitreoretinal services and serves as an accredited ophthalmology and optometry training facility to build future workforce capacity. To evaluate the Hub's impact on service delivery, we compared cataract surgery rate (CSR) and cataract surgery wait time (CSWT) before and after its establishment. CSR increased to 13 881 per million among First Nations people (six times the Australian average), and CSWT shortened by a factor of 2.7 through Telehealth-assisted booking, reducing median wait to 149 days from referral to surgery. This retrospective interrupted time series analysis compared all cataract surgeries performed in the Kimberley in 2019 (pre-Hub) to 2023 (post-Hub). Patients were reviewed either face-to-face or via Telehealth with optometry support at the time of booking surgery. CSR was calculated by dividing the total number of procedures performed by the total population, per-million (ABS 2021 Census [1]). Accounting for the 'hidden wait' [2] (the wait for a specialist assessment after obtaining a general practitioner or optometry referral), CSWT was calculated as days between referral date to first surgery date. The Wilcoxon rank-sum test was used to assess for statistical significance. This study was approved by the Western Australian Aboriginal Health Ethics Committee (HREC1361).

Five hundred and four eyes of 397 patients underwent cataract surgery in the Kimberley pre- and post-Hub. Three patients had surgery in both years. Table 1 summarises pre- and post-Hub demographic and clinical information, highlighting that a large proportion were First Nations Australians.

Using the latest 2021 Kimberley census data [1], the pre-Hub CSR was 3590 per-million, just above the World Health Organisation's (WHO) suggested minimum target of 3000 to manage cataracts with an acuity of less than 6/60 [3]. Unsurprisingly, CSR tripled to 10 771 per-million post-Hub. For First Nations Australians, pre-Hub CSR was 5483 per-million, which increased to 13 881 per-million post-Hub and is 6 times more than the Australian average [4]. A key component to engage First Nations Australians was to foster a strong connection between the Kimberley Hub and the local community to promote health literacy and awareness. Employment of local 'Aboriginal Liaison Officers' was pivotal in promoting culturally appropriate consultations in addition to patient transport to and from the clinic and the local hospital.

Median CSWT decreased by approximately 4.5 months ($p < 0.001$) and the difference in CSWT for First Nations and non-First Nations Australians was eliminated post-Hub (see Table 2). There was a significantly shorter median CSWT of cases booked via Telehealth than face-to-face: 157 days (99–286) compared to 292 days (161–518), respectively ($p < 0.001$). This was most notable for First Nations patients ($p < 0.001$), but not for non-First Nations Australians ($p = 0.119$). Direct surgical booking via Telehealth at the time of optometric assessment was an important factor, particularly for patients from more remote communities who were geographically isolated across the state. CSWT was reduced further with the

TABLE 1 | Baseline demographic and clinical characteristics of patients undergoing cataract surgery in the Kimberley, 2019 versus 2023.

Characteristic	2019	2023
Number of patients	**120**	**280**
Age at surgery (years), mean (SD)	64.1 (11.1)	65.1 (10.2)
Sex, *n* (%)		
Female	55 (46%)	135 (48%)
Male	65 (54%)	145 (52%)
First Nations Australians, *n* (%)	78 (65%)	157 (56%)
Referrals		
Optometrists	75 (63%)	157 (56%)
Medical practitioners	30 (25%)	59 (21%)
External ophthalmologists	5 (4%)	4 (1.5%)
Nurse practitioner	0	1 (0.5%)
Missing	10 (8%)	59 (21%)
Number of eyes	**126**	**378**
Surgery booked via Telehealth	30 (24%)	122 (32%)
First eye procedure, *n* (%)	69 (55%)	187 (49%)
Second eye procedure, *n* (%)	57 (45%)	191 (51%)
Complicated procedure, *n* (%)	11 (9%)	10 (3%)
Post-operative appointment attendance, *n* (%)	108 (86%)	352 (93%)
Post-operative refraction, *n* (%)	31 (29%)	206 (59%)

introduction of immediate sequential bilateral cataract surgeries (ISBCS) where appropriate, a method shown to be safe and more cost-effective than delayed cataract surgery [5]. As 22 LOV patients underwent ISBCS post-Hub, this may be one practical solution towards addressing eye health inequities in rural Australia.

Median time on public hospital surgical waitlist for first eye surgery was significantly longer pre-Hub compared to post-Hub: 247 days (141–297) versus 119 days (63–231), respectively ($p < 0.001$). However, this was no different based on ethnicity ($p = 0.119$). Compared to the national average, the post-Hub waitlist time was lower for both First Nations (128 vs. 159 days) and non-First Nations Australians (108 vs. 118 days) [4]. This may be due to the aforementioned reasons; however, it also likely reflects the strong commitment of a non-government organisation to advocate for the region, resulting in public funding and philanthropic support for service delivery.

Pre-Hub pre-operative median visual acuity of 6/18 (6/12–6/60) was no different to 6/18 (6/12–6/36) post-Hub ($p = 0.042$); however, post-operative median visual acuity was slightly better post-Hub (6/9 vs. 6/6, respectively, $p < 0.001$). Improved post-Hub post-operative vision was likely due to utilising better equipment (such as Zeiss IOLMaster 700 and OCULUS Pentacam), having staff to assess pre-operative refractive status, and having the flexibility to repeat biometric measurements.

TABLE 2 | Median (IQR) cataract surgery wait time.

By First Nations descent in each year				
Year	**Total**	**First Nations**	**Non-First Nations**	***p*†**
2019	328 days (249–537, *n* = 77)	411 days (257–642, *n* = 50)	288 days (191–374, *n* = 27)	0.016
2023	196 days (107–381, *n* = 190)	186 days (106–423, *n* = 107)	208 days (107–286, *n* = 83)	0.479
By booking method and First Nations descent				
Ethnicity	**Telehealth**	**Face-to-face**	***p*†**	
First Nations	149 days (98–316, *n* = 69)	401 days (227–715, *n* = 88)	< 0.001	
Non-First Nations	189 days (107–285, *n* = 36)	246 days (141–374, *n* = 74)	0.119	

†Wilcoxon rank-sum test.

These findings demonstrate that a permanent regional ophthalmic service can markedly improve both access and timeliness of cataract surgery in the underserved Kimberley region. Using CSR and CSWT as surrogate markers of service delivery, our current surgical capacity is substantially above the WHO's recommendations and the Australian average. Our model of care may be a strong example for those who plan to reduce the healthcare, psychosocial, and economic burden associated with visually significant cataracts in underserviced Indigenous populations.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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