THE FOCUS STUDY

Falls and Cataract: Investigating Risk and Predictors in Older Adults During their Wait for Surgery

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BACKGROUND

- Cataract is the leading cause of vision impairment globally. An estimated one-third of the Australian population aged ≥65 years have clinically significant cataract, representing ~1.2 million people.[1]
- People with cataract have an approximately three-times increased risk of falling.[2] In Australia, falls incur over A$1 billion in treatment, disability, lost output and mortality each year.[3]
- Cataract surgery is a highly effective at restoring sight,[4] but long waiting times for public cataract surgery are common in Australia.[5] Patients can wait up to three years for first eye surgery: an initial two years for outpatient ophthalmology assessment[6] and a further wait of 12 months on the surgical waiting list.[5]
- There is evidence of benefit of expedited cataract surgery to the reduction of falls. A randomized controlled trial in the UK found a 34% reduction in the rate of falls in patients undergoing cataract surgery within one month of referral compared to those experiencing a routine 12 month wait.[7]

OBJECTIVE

To explore the burden of falls in older Australians with cataract during their wait for first eye cataract surgery, and assess mechanisms associated with an increased fall risk.

METHODS

Pre-surgical data from a prospective study of falls in a cohort of patients aged ≥65 years on Australian public hospital cataract surgery waiting lists (The FOCUS Study) were analysed. Participant eligibility criteria are presented in **Table 1**.

Table 1: Participant eligibility criteria for The FOCUS Study.

Age	65 years or older
Ocular status	Presenting for first eye cataract surgery; bilateral cataract (no combined surgery)
Mental status	No diagnosis of dementia, Parkinson's disease or stroke
Type of residence	Living in community or self-care unit of retirement village
Ocular co-morbidities	No other significant ocular comorbidities
Mobility	Must be able to walk (not wheelchair bound)

Participants were recruited from eye clinic referral records and surgical waiting lists at eight public hospitals in Sydney, Melbourne and Perth, Australia. Baseline assessments included:

- Measures of visual function (visual acuity, contrast sensitivity, stereopsis, refractive error, spectacle correction, ocular dominance)
- Visual disability (Catquest-9SF)
- Medications and comorbidities
- Fear of falling (Short Falls Efficacy Scale-International)
- Depressive symptoms (5-item Geriatric Depression Scale) and quality of life (QoL; EQ-5D-5L)
- Exercise frequency (Incidental & Planned Exercise Questionnaire) and Physical function (Short Physical Performance Battery).

Falls Monitoring

Participants recalled falls in the 12 months prior to Baseline and self-reported falls prospectively during their surgical wait using monthly calendars. The context and outcomes of any falls were determined by phone interview.

Statistical Analysis

Fall rate during the cataract surgery waiting period was the primary outcome measure and was calculated using the formula:

Total prospectively reported falls ÷ Total time (in years) in study pre-surgery.

Factors predictive of an increased fall risk were assessed using negative binomial regression; the logarithm of the time of observation prior to first eye cataract surgery was used as an offset in the model. A sub-group analysis was conducted to assess differential factors predicting falls in those who fell twice or more during their surgical wait ('multiple fallers'). Analyses were completed using SAS Enterprise Guide version 5.1 (SAS Institute, Inc., Cary, NC).

Ethics

Ethical approval was granted by the NSW Population and Health Services Research Ethics Committee and site-based governance bodies. Written informed consent was provided by all participants prior to commencing participation.

RESULTS

- Baseline characteristics of participants (N=329) are presented in **Table 2**. Participants' habitual vision was an average Snellen acuity of 6/12[#1] (**Figure 1**) and 10% were vision impaired (<6/18).

Table 2: Baseline characteristics of 329 participants of The FOCUS Study.

Female, n (%)	182 (55.3)
Age (years)	76 ± 5
Live alone, n (%)	98 (29.8)
Habitual spectacle correction, n (%)	
None	151 (45.9)
Bifocal or multifocal	136 (41.3)
Bilateral visual acuity (lines on ETDRS chart)	20/40 ± 2 lines
Bilateral contrast sensitivity (log units)	1.48 ± 0.21
Visual disability (Catquest-9SF: 0 least–100 most)	38.6 (14.6)
Vision impaired (<20/60), n (%)	20 (8.9)
Total medications, median (range)	4 (1–20)
≥10 medications, n (%)	33 (10.0)
Comorbidities	4.3 ± 2.2
Body mass index	27.8 ± 5.8
Quality of life (EQ-5D-5L VAS: 0 worst–100 best)	76.4 (17.9)
Depressive symptoms (GDS-5 score ≥2)	94 (28.6)
Weekly physical activity (hours)	42.8 ± 24.2
Walking activity	3.5 ± 4.9
Physical function (SPPB score: 0 worst–12 best)	8.1 (2.8)
Fear of falling (SFES-I: 7 least–28 most)	11 (4)
Fallen in past year, n (%)	129 (40.2)

All values expressed as mean ± standard deviation unless otherwise stated. GDS5, 5-Item Geriatric Depression Scale; SFES-I, Short Falls Efficacy Scale-International; SPPB, Short Physical Performance Battery; VAS, visual analogue scale.

Figure 1: Simulation of participants' average habitual vision (Snellen acuity 6/12[#1]).

The Wait for Cataract Surgery

- Median time of participant observation was 176 days (5.7 months; range 2–730 days).
- Times >365 days were experienced by participants recruited from outpatient ophthalmology clinic referral letters and those with unintended surgery delays due to ill health.

Falls During the Wait for Cataract Surgery

- A total of 267 falls were reported by 101 (31%) participants during their wait for first eye surgery; **the rate of falling was 1.2 per person-year**.
- Poorer contrast sensitivity, greater visual disability, more comorbidities, increased walking activity, and lower body mass index were predictive of an increased rate of falls in the univariate model.
- Increased walking activity (IRR 1.1, 95%CI 1.0–1.1; p=0.02), lower body mass index (IRR 0.96, 95%CI 0.9–1.0; p=0.06), and poorer quality of life (IRR 0.9, 95%CI 0.8–1.0; p<0.001) remained independently associated with an increased rate of falls in the final age- and sex-adjusted multivariate model (**Table 3**).

Table 3: Factors predicting an increased rate of falls in participants waiting for cataract surgery (N=329).

	Unadjusted			Adjusted		
	IRR	95% CI	p value	IRR	95% CI	p value
Age (per 5 year increase)	0.91	0.73-1.13	0.38	0.83	0.66-1.05	0.11
Female	0.99	0.63-1.57	0.98	1.10	0.69-1.75	0.70
Visual acuity (bilateral, per 5 ETDRS letters)	0.98	0.88-1.09	0.71			
Contrast sensitivity (bilateral, log units)[a]	0.90	0.78-1.04	0.16	0.98	0.85-1.12	0.74
Physical activity (hours/week)	1.00	0.99-1.01	0.97			
Walking activity (hours/week)	1.03	0.98-1.08	0.22	1.05	1.01-1.10	0.02
Physical function (SPPB ordinal score)	0.93	0.86-1.01	0.10	1.01	0.93-1.11	0.75
Multifocal/bifocal habitual use	0.90	0.57-1.43	0.66			
Body mass index	0.97	0.93-1.01	0.11	0.96	0.92-1.00	0.06
Comorbidities	1.13	1.02-1.26	0.02	1.05	0.94-1.18	0.36
Total medications	1.02	0.96-1.08	0.55			
≥10 medications	1.56	0.76-3.20	0.22	1.06	0.48-2.32	0.89
Depressive symptoms (GDS-5 ≥2)	1.28	0.79-2.07	0.32			
Quality of life (EQ-5D-5L VAS: 0–100, per 5 units)	0.90	0.84-0.96	<0.001	0.89	0.84-0.95	<0.001
Catquest-9SF (0–100, per 5 units)	1.08	1.00-1.17	0.05	1.06	0.98-1.15	0.14
Fallen in 12 months prior to Baseline	2.45	1.57-3.82	<0.001	2.69	1.72-4.20	<0.001

CI, confidence interval; ETDRS, Early Treatment Diabetic Retinopathy; IRR, incidence rate ratio; VAS, visual analogue scale.

- Multiple falls (range 2–31 falls) were experienced by 49 (15%) participants during their surgical wait. Poorer quality of life at baseline was the sole predictor of experiencing multiple falls (OR 0.88, 95%CI 0.81–0.95 per 5 unit reduction in QoL; p=0.002).
- Over one half (n=138, 52%) of falls were injurious, including 14 head injuries and 2 fractures. Twenty-two (8%) of all falls resulted in a visit to the general practitioner and 4% of falls presented to the hospital emergency department.

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DISCUSSION

- These findings demonstrate a high rate of falls and fall-induced injury in older adults with cataract waiting for surgery in Australia, and provide insight into associations with increased fall risk.
- Within this relatively homogeneous group of participants, all of who had clinically significant cataract, measures of visual function inadequately predicted fall risk. Measures of exposure (e.g. walking activity) may prove more valuable in assessing fall risk in the older population during the cataract surgery wait.
- Wait time for first-eye cataract surgery in the Australian public hospital system remains significant for many. Applying Harwood's [7] 34% reduction in falls resulting from the provision of cataract surgery within one month of referral to our cohort suggests the burden of falls may be significantly reduced if wait times are curtailed (**Figure 2**), i.e. an estimated 91 falls potentially avoided. Further confirmation of the impact of expedited cataract surgery on fall risk is needed.

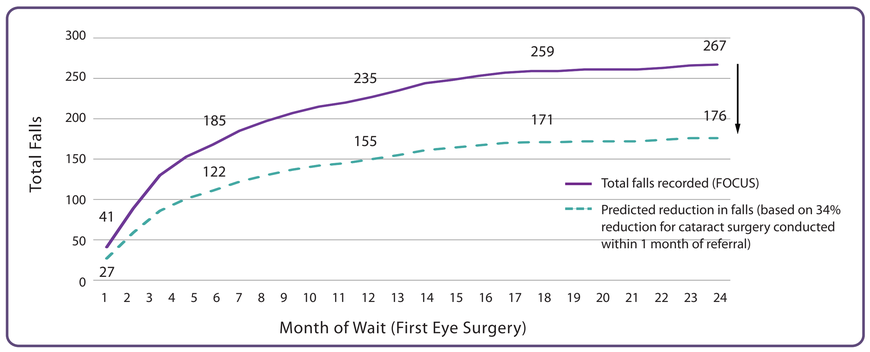

Figure 2: Predicted reduction in falls over a 24 month period if participants underwent cataract surgery within one month of referral, compared to actual wait time (based on 34% reduction in falls reported by Harwood et al [7]).

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