Cataract surgery in New Zealand /Aotearoa approaching 2020: demand, supply, politics, economics & shared care

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Introduction: cataract

The most common cause of visual impairment
The most common surgical procedure in the developed world
Extremely efficient, effective and safe health-dollar investment!

Why can we never meet the annual demand?

New Zealand > 30,000
Australia > 160,000
United Kingdom > 390,000
United States > 3,600,000
Globally > 20 million
Political solutions or misdirection

Cataracts and hip replacement surgery the currency of election healthcare policies

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Considering Cataract Outcomes in NZ
The Auckland Cataract Studies 2000-2017
Cataract surgery is most common surgical procedure in New Zealand

Typically presents to optometrists and general practitioners
International Cataract Costs
We are more, not less, expensive!
Potential barriers to successful cataract surgery & visual rehabilitation in NZ

1. Identifying visually significant cataract
2. Referral and first specialist visit
3. Assessing suitability, eligibility, listing
4. Pre-operative assessment
5. Provision of excellent surgical services
6. Post-operative care
7. Dealing with complications
8. Potential barriers to discharge*
9. Long term Optical correction
10. Funding the process: Government, Health Insurers, Self
Aetiology of cataract

- Congenital
- Inherited
- **Age-related (the majority)**
- Metabolic – e.g. diabetes
- Toxic – e.g. corticosteroids
- Traumatic – e.g. irradiation
- Secondary – e.g. uveitis
Diagnosing cataract

- **Reduced visual acuity**
  - Snellen, glare, contrast sensitivity, driving

- ** Entirely clinical diagnosis**
  - Distance & near vision
  - Ophthalmoscope
  - Slit lamp microscope
  - Significant lens opacity

- **Exclude other ocular pathologies**
Effect of differing cataracts

• **Nuclear Cataract**
  – Common, VA may be preserved
  – may induce myopia

• **Cortical Cataract**
  – Often associated with nuclear
  – *May cause distortion/glare*

• **Subcapsular Cataract**
  – May have good vision in test conditions
  – Variable vision particularly in low light
  – *Consider history and test glare vision*
“cataract is responsible for 51% of world blindness, which represents about 20 million people (2010)”

World Health Organisation

http://www.who.int/blindness/data_maps/cataract_surgery_rate/en/
The Auckland Cataract Study 1: 2000-2001: Waiting – the harbor bridge study N=193

Mean age 77.2 years
Mean wait 18.2+/11.6 mths
Mean BCVA 6/36*

Outcome

Still waiting 49%*
Expedited Rx 4%
Private surgery 21%
Deceased 12%
Declined surgery 2%

The Waiting Game: The natural history of a cataract waiting list in New Zealand
The majority of those with significant cataract have General Health issues:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>25%</td>
</tr>
<tr>
<td>Cerebral vascular disease</td>
<td>12%</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>11%</td>
</tr>
<tr>
<td>Ischaemic Heart disease</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Rx**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>42%</td>
</tr>
<tr>
<td>Warfarin</td>
<td>6%</td>
</tr>
</tbody>
</table>

Pre-proliferative diabetic retinopathy

Ocular co-morbidities in cataract patients

- Open-angle glaucoma: 10%
- Diabetic retinopathy: 6%
- Vein occlusion: 2%
- Advanced AMD: 1%**

Cataract Surgery

Ancient Techniques
- Couching

Current cataract techniques

Intra-capsular –
Now mainly in developing world

Extra-capsular –
Some use in developed world

Phacoemulsification –
most popular technique

Femto-laser assisted
Use increasing in developed world
1990’s small incision phaco-emulsification and the evolution of foldable/injectable Intraocular lenses revolutionized cataract surgery in developed world.
Extracapsular surgery: ECCE vs Phaco
Auckland Cataract Study 1: 2000-2001

Outcome:
Mean BSCVA 6/7.5 (88% > 6/12)
Mean SphEq -0.46+/-0.89D

Complications:
4.9% capsular tears
3.7% cystoid macular oedema
0.2% endophthalmitis
1.5% of eyes red’n BSCVA due to surgery

The Auckland Cataract Study: co-morbidity, surgical techniques and clinical outcomes in a Public Hospital Service. Andrew Riley, Tahira Malik, Christina Grupcheva, Michael Fisk, Jennifer Craig, Charles McGhee. BJO 2002
The timing of referral varies significantly with available local DHB funding, however, many would consider referring when vision $\leq 6/12$.

**Current cataract referral waiting times:**
1. From referral to FSA (4 months)
2. From FSA to surgery (4 months)

**Cataract referrals at ADHB via three main routes:**
- General Practice
- **Optometrist**
- Ophthalmologist
Efficiency: Radical streamlining of existing systems?

1. Immediate listing from the community
2. Combined Optometry/General Practitioner electronic referrals
   Enables collection of demographic data and risk analysis
3. Same day FSA clinic review and surgery
4. Electronic surgical records
   Enables ongoing audit and creates discharge
5. Bilateral same day cataract surgery
6. Immediate discharge to optometric shared care

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Improving the operative rate for cataract surgery

Kevin Holmes, BMBS, Jonathan Park, FRCOphth, BSc, Derek Tole, FRCOphth

One stop cataract clinic N=4657 (Bristol, 2008-2010)

Two referral routes – traditional GP route and Refined Direct Optometrist (RDO) pathway

Operative rates higher for RDO (92%) than GP (82%) routes

“By combining referral information from optometrists and GPs, a high-quality and efficient cataract surgery patient pathway can be established. This has major economic advantages, and this scheme could be adopted at a national level.”
Cambridgeshire cataract shared care model: community optometrist-delivered postoperative discharge scheme

George Voyatzis,¹ Harry W Roberts,¹ Jonathan Keenan,¹ Madhavan S Rajan¹,²

Uncomplicated surgery and no significant ocular comorbidity - *same day discharge to community optometrists.*

Over 2 years, 1492 of 2461 (61%) Cambridgeshire patients discharged to community on day of cataract surgery.

Complete feedback in 97%, uneventful in 94% and 3% of patients re-referred. CMO 0.6%, uveitis 1.0% and raised IOP 0.1%.

No patients had sight-threatening complications in this study
Preoperative **RISK** stratification
maximizing outcomes, safety and audit

- Scores for **patient risk factors** documented in the clinical notes
- A validated system devised by Muhtaseb et al. (2004, UK)

<table>
<thead>
<tr>
<th>1 point</th>
<th>3 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age &gt;88 years</td>
<td>Brunescent/white/dense/total cataract/no fundus view</td>
</tr>
<tr>
<td>Ametropia (&gt;6D of myopia or hyperopia)</td>
<td>Pseudoexfoliation</td>
</tr>
<tr>
<td>Corneal scar</td>
<td></td>
</tr>
<tr>
<td>Posterior capsule plaque</td>
<td></td>
</tr>
<tr>
<td>Posterior polar cataract</td>
<td></td>
</tr>
<tr>
<td>Previous vitrectomy</td>
<td></td>
</tr>
<tr>
<td>Shallow AC &lt;2.5mm</td>
<td></td>
</tr>
<tr>
<td>Small pupil &lt;3mm</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous (poor position, etc)</td>
<td></td>
</tr>
</tbody>
</table>
Auckland Cataract Study IIa and IIb
Risk of intraoperative complications

- Observed higher complication rates with high risk scores
- Significant increase for scores >3
Intraoperative complications in cataract surgery (N=1000)
Following introduction of risk analysis in ADHB

<table>
<thead>
<tr>
<th>Intraoperative complications</th>
<th>2015</th>
<th>2016</th>
<th>P-value for difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC tear ± vitreous loss</td>
<td>8.4% (N=500)</td>
<td>5.0% (N=500)</td>
<td>0.042</td>
</tr>
<tr>
<td>Anterior capsular tear</td>
<td>2.6%</td>
<td>1.8%</td>
<td>0.258</td>
</tr>
<tr>
<td>Zonular dialysis</td>
<td>1.2%</td>
<td>0.4%</td>
<td>0.224</td>
</tr>
<tr>
<td>Iris prolapse</td>
<td>1.6%</td>
<td>0.6%</td>
<td>0.224</td>
</tr>
<tr>
<td>Iris trauma</td>
<td>1.0%</td>
<td>1.4%</td>
<td>0.773</td>
</tr>
<tr>
<td>Dropped nucleus fragment</td>
<td>0.2%</td>
<td>0.4%</td>
<td>1.000</td>
</tr>
</tbody>
</table>

### Auckland Cataract Study 2: Postoperative complications

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
<th>2016</th>
<th>P-value for difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postoperative complications</td>
<td>8.1% (N=479)</td>
<td>6.1% (N=472)</td>
<td>0.258</td>
</tr>
<tr>
<td>Cystoid macular oedema</td>
<td>3.5%</td>
<td>3.8%</td>
<td>0.865</td>
</tr>
</tbody>
</table>
Auckland Cataract Study 2: Postoperative complications: Cystoid macular oedema

- **Rare**
  - Endophthalmitis
    - Pain, redness, decreased vision in first week
  - Intra-ocular haemorrhage
  - Severe uveitis

- **More common**
  - Cystoid macular oedema
    - Typically in first month – suspect if vision has been good and deteriorates moderately in quiet eye
  - Mild uveitis beyond 4 week
RADICAL ROUTES TO IMPROVED CATARACT SURGERY PROVISION: Excellence, Efficiency, Economy top ten

1. Fully electronic pathway
2. Optometry/GP referral / listing
3. Risk stratification analysis and audit
4. Consider one-stop surgical approach
5. Bilateral same day surgery where appropriate
6. In teaching units create (hi-volume) service vs training lists
7. Day-one discharge to community optometry in >50% cases
8. Standardised data set pre and post-op
9. Unified national program and agreed threshold
10. Continuous audit cycle – Local, DHB and National level
Shared care in cataract surgery

- Identifying
- Appropriately referring
- Pre-operative assessment
- **Post operative management***
- **Unexpected complications***
The fine-print of co-management

RANZCO is opposed to any payment, which could in any way be perceived or is an inducement to refer, by an ophthalmologist to any party who refers a patient to them.

Where co-management is in the best interest of a patient, the fundamental principle is that a patient should always be aware of and responsible for all fees associated with the delivery of the services that they receive from the attending practitioner, including pre and post-operative care where required.

Where co-management is in the best interest of a patient, the following must apply:

- All responsibility and management decisions remain with the ophthalmologist;
- A co-managing practitioner and an ophthalmologist must communicate with each other at every encounter between the patient and the co-managing practitioner, and wherever possible communication should be done in writing or followed-up with a written summary;
- An ophthalmologist is satisfied that the co-managing practitioner has competence appropriate to the tasks involved. In general, post-operative care should if at all possible, be provided by the ophthalmologist performing the procedure. No payments should be made, directly or indirectly, to any practitioner providing post-operative care.
- The co-managing practitioner MAY separately bill the patient for the services they render. It is not acceptable to offer to any referring practitioner payment or reward for any services or investigations that have been performed by the referring practitioner. Payments for these services are the responsibility of the patient.

Approved by: Board
Approval date: 1 March 2013
Next review: 1 March 2016
Common complications

- Striate keratopathy
- Elevated IOP
- Aqueous leak
- Ant. Uveitis
- Loose sutures*

Rare complications
- Retinal detachment
- Choroidal haemorrhage
- Filtering bleb
Endophthalmitis – always a risk?

- 94,653 cataract procedures in 19 years
- Endophthalmitis in 188 patients
- Serious visual impairment in 70.6%
- Incidence of cataract surgery increased x3
- However, endophthalmitis rate constant at 2 per 1000

Post-operative management

- Day 1 review
- Symptoms
- Unaided VA
- Pinhole VA*

- Assess:
  - Cornea
  - Pupil
  - Media
  - IOL position
  - IOP

IOP: 36
Post-operative management

- Usually 2-4 weeks post-operative topical medication

- Typically an antibiotic and a steroid
  - E.G. g. Chloramphenicol QDS / g. ciprofloxacin TDS*
  - E.G. g. Predforte QDS / g. Maxidex QDS
  - Or Maxitrol (dexamethasone + neomycin + polymyxin B)
  - Or occasionally NSAIDS e.g. ketorolac/diclofenac
Post-operative management

Post-op vision & visual acuity

Day one and day seven:

- Usually 6/6 to 6/18
- If less than 6/12 unaided – refract
- More than 1.5D residual error - consult
1/12 post-op vision & best corrected visual acuity

- Generally BSCVA ≥ 6/7.5
- BSCVA <6/12, exclude pathology:
  - Cystoid macular oedema
  - Posterior capsule opacity
  - Macular degeneration
  - Diabetic maculopathy
Post-operative management

Post-operative refractive error

Contact ophthalmologist if (*):

- ≥1.50D from intended refraction
- ≥1.50D of induced astigmatism
Wound appearance and aqueous leak

Day 1 wound should well apposed, if anterior chamber shallow or IOP <10mmHg exclude wound leak:

- Check for phaco burn or wound retraction
- Perform fluorescein test
  - Spontaneous leak
  - Leak to gentle compression
- Check pupil is round
- Exclude iris prolapse
- If AC compromised refer
DAY 1

- Generally less than 24mmHg
- Less than 10mmHg consider leak
- Greater than 30mmHg or painful
  - Consider acetazolamide
  - Consider referral
Appearance related to cataract density, difficulty of case, nucleus density, FECD and phaco energy used:

1. Entirely clear
2. Occasional effete endothelial cells
3. Focal striae & oedema at incisions
4. Extensive striae & oedema

Generally resolves - <0.5% develop PBK
Postoperative pupil

- Should be round, up to mid-dilated,

- If distorted exclude:
  - Iris prolapse
  - Vitreous to wound
  - Vitreous in anterior chamber
  - IOL displacement
Anterior chamber inflammation

- **Day 1**
  - Flare +
  - Cells + to ++
  - If heavy flare or cells +++ consider endophthalmitis

- **Day 28**
  - Usually no activity
  - 5% may have persisting low-grade inflammation
<table>
<thead>
<tr>
<th>Visual acuity</th>
<th>2015 (N=476)</th>
<th>2016 (N=472)</th>
<th>P-value for difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaided</td>
<td>6/12</td>
<td>6/12</td>
<td>0.262</td>
</tr>
<tr>
<td>Best-corrected</td>
<td>6/9</td>
<td>6/9</td>
<td>0.648</td>
</tr>
</tbody>
</table>
Postoperative IOL position

- **IOL should be well centred**
  - Relative to capsular bag / rhesis
  - Relative to pupil

- **If > 1.0mm IOL displacement**
  - Consider haptic position
  - Assess for vitreous in AC
  - Discuss with ophthalmologist
If BSCVA less than expected

Assess macula

Exclude retinal detachment

Exclude vitreous/retinal haemorrhage
Day 28 review
Symptoms
Unaided VA
Refraction
Assess:
  - Cornea
  - Pupil
  - Media
  - IOL position
  - IOP
  - Dilated fundus
Delayed complications

- Posterior capsular thickening 2-5%
  
  Rx YAG laser

- Capsular phimosis

- Retinal detachment 1%
Posterior Capsular Opacification
YAG Laser capsulotomy
<table>
<thead>
<tr>
<th>Assessment</th>
<th>Normal</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unaided vision</td>
<td>6/18 - 6/5</td>
<td>Refract if &lt;6/12</td>
</tr>
<tr>
<td>Corrected vision</td>
<td>6/6 – 6/12</td>
<td>Exclude causes of reduced BSCVA if &lt;6/12</td>
</tr>
<tr>
<td>Refractive error</td>
<td>+/-1.00D of intended</td>
<td>If greater than 1.50D deviation from intended endpoint contact ophthalmologist</td>
</tr>
<tr>
<td>Exclude wound leak</td>
<td>None</td>
<td>If spontaneous &amp; AC compromised - refer</td>
</tr>
<tr>
<td>Wound appearance</td>
<td>Closed</td>
<td>exclude phaco burn, retraction, or leak</td>
</tr>
<tr>
<td>Goldman IOP</td>
<td>&lt;24mmHg</td>
<td>If painful or &gt;30mmHg Rx diamox or refer</td>
</tr>
<tr>
<td>Corneal striae or oedema</td>
<td>None/Minimal</td>
<td>Observe, should settle in few days</td>
</tr>
<tr>
<td>Anterior chamber activity</td>
<td>Flare+, cells + to ++</td>
<td>If marked activity consider endophthalmitis or secondary uveitis - refer</td>
</tr>
<tr>
<td>Pupil</td>
<td>Round, up to mid-dilated</td>
<td>If distorted: exclude iris prolapse, vitreous in AC or to wound, or IOL displacement - refer</td>
</tr>
<tr>
<td>IOL position</td>
<td>Well-centred in the bag</td>
<td>If greater than 1.0mm decentred - refer</td>
</tr>
<tr>
<td>Fundal examination</td>
<td>Clear view</td>
<td>Exclude haemorrhage, detachment</td>
</tr>
</tbody>
</table>
What to tell your patients?

- Public surgery at ≤ 6/12 vision (Private insurers typically ≤ 6/9)
- Will need to complete “Impact on life” questionnaire
- Cataract surgery is safe and typically takes < 30 minutes
- Small risk of intra/post-operative complications < 5%
- More than 95% of patients will have significant improvement
Thank you