A Cost-Benefit Analysis Comparing Trifocal Intraocular Lens (IOL) with Monofocal IOL from Patient Perspective in the USA

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Financial Disclosures

- John Berdahl received consulting fees from Alcon Vision LLC.
- Chandra Bala received consulting fees from Alcon Vision LLC.
- Mukesh Dhariwal is an employee of Alcon Vision LLC (the study sponsor).
- Hemant Rathi and Ritu Gupta are employee of Skyward Analytics and received consulting fees from Alcon Vision LLC.
What is the utility of health economic evaluation?

Limitations of Clinical Data for new Med-Tech products

- Partial Comparisons
- Lack of Generalisability
- May not Reflect Routine Clinical Care
- Short follow-up
- Actual costs (beyond the product)

An appropriate Health Economic Evaluation can fill the gaps:

- All evidence (beyond trial)
- Quantification of uncertainty
- All relevant comparisons
- Long-term Time horizon
- Detailed cost perspective
Study Objective

- To evaluate the improved vision related quality of life and the net monetary benefit for choosing AcrySof™ IQ PanOptix™ vs. standard monofocal IOL

Methodology

- **Type of analysis**: Cost-benefit analysis
- **Modeling method**: Markov model
- **Time horizon**: remaining patient lifetime (distributed using CDC life-expectancy tables, max=30 years)
- **Perspective**: Patient
- **Country**: USA
- **Intervention**: PanOptix™
- **Comparator**: Monofocal (SN60AT)
### Key Health Economic Concepts relevant to this study

<table>
<thead>
<tr>
<th>Concept</th>
<th>What is it?</th>
</tr>
</thead>
</table>
| Patient’s Quality of Life        | ✓ Multi-dimensional concept; includes patients’ subjective evaluations of positive/negative aspects of life/disease condition<sup>1</sup>  
  ✓ Quantified using metric called as Quality Adjusted Life Year (QALY)*                                                                 |  
|                                  |                                                                                                                                                                                                          |
| Patient Willingness-To-Pay (WTP) | ✓ How much patients are willing to pay for an additional health outcome (QALY); WTP in the US is $50k-$150k per QALY gain<sup>2</sup>                                                                    |  
| Net Monetary Benefit (NMB)      | ✓ Clinical benefit difference between two treatments is expressed in monetary units after accounting for cost-difference between them                                                                          |  

* QALY = Length of life spent in a condition x Quality of life gained/lost due to a condition/treatment; Utility informs ‘quality’ weight in QALY, and it varies from 0 (death) to 1 (perfect life)

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Model outcomes

• Model estimates the following outcomes for each intervention (PanOptix™ and monofocal):
  • Expected Lifetime Costs to patients
  • Expected Patient’s Quality of Life improvement (measured using Quality Adjusted Life Year (QALY) metric)

• Incremental analysis:
  • Improved quality of life (Bilateral PanOptix™ vs. Monofocal)
  • Net Return on Patient’s upfront investment in PCIOL (measured by Net Monetary Benefit (NMB))
All patients start in the Well health state.

Some may experience visual disturbances.

For some visual disturbances, they may resolve over a period of time.

Patients may receive LASIK surgery.

Patients may remain in the same health state or die from all health states.

Post surgery, some patients may need spectacles.

Patients may die from all health states.

Glasses with glare and/or haloes and/or starburst can be used.

Death, glare, and/or haloes and/or starburst with glasses being used.
## Model Inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parameter</strong></td>
<td><strong>PanOptix</strong></td>
<td><strong>SN60AT</strong></td>
</tr>
<tr>
<td>• Bothersome Visual Disturbances (Glares or Halos or Starbursts)*</td>
<td>12%</td>
<td>7%</td>
</tr>
<tr>
<td>• Post-op Overall Spectacle Dependence**</td>
<td>19.5%</td>
<td>91.2%</td>
</tr>
<tr>
<td>• IOL explantation rate</td>
<td>0.8%</td>
<td>0.9%</td>
</tr>
<tr>
<td>• YAG capsulotomy rate</td>
<td>24.8</td>
<td>6.1%</td>
</tr>
<tr>
<td>• Cost of bilateral procedure</td>
<td>$6,000</td>
<td>$517</td>
</tr>
<tr>
<td>• YAG procedure, lens exchange, optometrist visit, post-op eye drops</td>
<td>Assumed at 15% patient co-pay for national Medicare FFS schedule</td>
<td></td>
</tr>
<tr>
<td>• Cost of spectacles per year</td>
<td>Readers: $48</td>
<td>Distance: $101</td>
</tr>
<tr>
<td></td>
<td>Bifocal/Progressive: $400</td>
<td>Walmart.com, internal data</td>
</tr>
<tr>
<td>• Patient reported impact on quality of life due to post-cataract events</td>
<td>Visual disturbances: -18%</td>
<td>Brown 2009</td>
</tr>
<tr>
<td></td>
<td>Spectacles: -7%</td>
<td>Dobrez 2004</td>
</tr>
<tr>
<td></td>
<td>Explantation: -15%</td>
<td>Busbee 2003</td>
</tr>
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**Notes:**

* Resolution rate of bothersome visual disturbances was assumed to be 81% at 6 months post surgery, similar to a recent multifocal IOL cost-effectiveness study (Q Hu et al. 2019)

** Type of spectacle dependence (Near/Distance/bifocal or progressive): PanOptix (75%/20%/2.5%/2.5%); Monofocal (40%/10%/25%/25%)-clinical experience input; 50% of PanOptix patients requiring reading glasses and 75% of patients requiring distance/bifocal/progressive spectacles were assumed to undergo LASIK surgery, out of which 90% will become spectacle independent

Lifetime cost of spectacles for patients receiving monofocal IOL was estimated to be ~$2,600 higher vs. PanOptix™
Patients with bilateral PanOptix™ can experience improved vision related quality of life over lifetime

PanOptix™ quality of benefits are on the top of Cataract surgery which in a previously conducted analysis (Brown et al 2013\textsuperscript{13}) showed an incremental QALYs of 2.82 over lifetime vs. no surgery

Improved Quality of life benefits with bilateral PanOptix™ implantation ~5 times over average bilateral PCIOL procedure price*

* At a WTP threshold of $50,000 per QALY gain, lifetime NMB per patient with bilateral AcrySof™ IQ PanOptix™ IOL implantation was $30,941 over upfront investment of $6k

Results

Scenario analysis shows even if the bilateral PanOptix™ procedure price is doubled to $12k, patient ROI remains at least 2 times over their upfront investment
Conclusions

This evaluation indicates bilateral implantation of PanOptix™ provides:

- Improved overall vision-related quality of life for patients (a gain of 0.67 QALYs over lifetime)

- This improved quality of life benefits translates into a net monetary benefit (aka ROI) for patients (2 to 5 times over bilateral PanOptix™ procedure price range: $6k-$12k)

- On average, PanOptix™ patients can expect lifetime spectacles cost savings of ~$2600 vs. those who opt for standard monofocal procedure
References