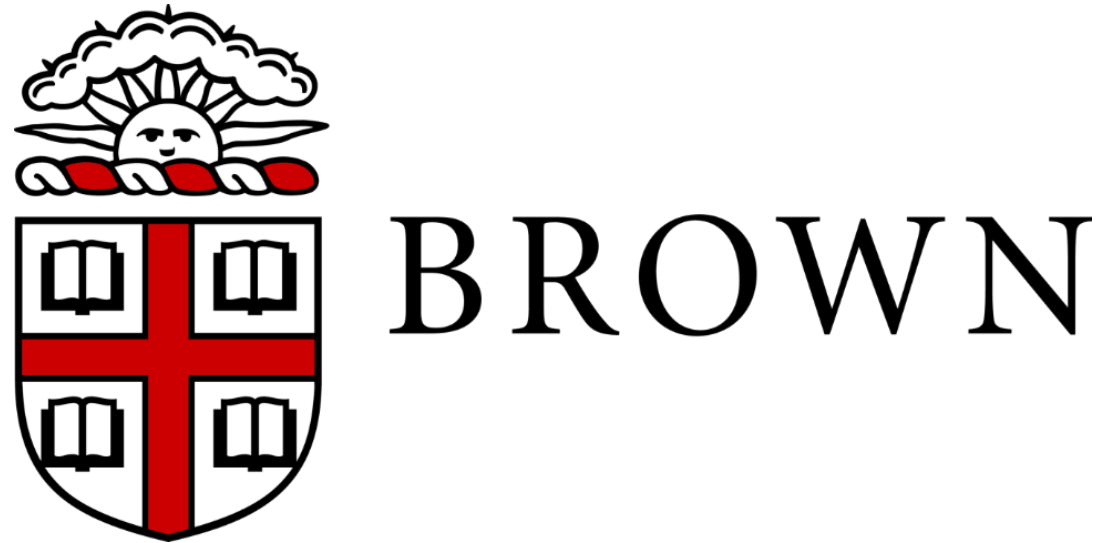




The Accuracy of Biometric Formulae for Intraocular Lens Power Calculation in a Teaching Hospital



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Introduction

- Cataract surgery is the most frequently performed ophthalmic procedure in the United States (US) and in the Veterans Health Administration (VHA)
- Continued improvements in optical biometry and intraocular lens (IOL) power calculation formulae have led to positive postoperative outcomes
- Relative accuracy of different formulae are affected by many factors, including axial length (AL)
- Refractive outcomes may be impacted in a teaching hospital by:
 - Resident surgeons of variable experience
 - Different personnel performing biometry and refractions
- This retrospective chart review investigated the most accurate biometric formula at a single teaching hospital and further compared formula accuracy in patients with short, medium, and long ALs

Methods

- Inclusion criteria:
 - Patients who received cataract surgery at the Providence Veterans Affairs Medical Center (PVAMC) using monofocal spherical SN60WF IOLs between November 2013 and May 2018
 - Only one eye was included from each patient
- Exclusion criteria:
 - Worse than 20/40 postoperative best corrected visual acuity (BCVA)
 - Posterior capsular rupture
 - Sulcus IOL
 - History of corneal disease
 - History of refractive surgery
 - AL or lens thickness (LT) not measurable by Lenstar optical biometer
 - No postoperative refraction within 3 weeks-4 months

- Predicted postoperative refractions extracted from software for the Barrett Universal II, Hill-Radical Basis Function (Hill-RBF), and Holladay 2 biometric formulae
- Calculated mean prediction error (ME), mean absolute prediction error (MAE), median absolute prediction error (MedAE), and percentage of eyes with prediction error of ± 0.25 Diopters (D), $\pm 0.5D$, and $\pm 1.00D$ for each formula
- Compared MAE among the three formulae using Friedman test
- Performed subgroup analyses for short (AL<22.0mm), medium (AL 22.0-25.0mm), and long eyes (AL>25.0mm)

Results

- Reviewed 1131 charts; 909 eyes met inclusion criteria
- Excluded patients:
 - 170 for lack of postoperative refraction within designated timeframe
 - 33 for <20/40 postoperative BCVA
 - 14 for complications
 - 5 for missing data
- Resident ophthalmologists were primary surgeons in 78.1% (710/909) of the cases
- Mean age was 74.5 ± 0.26 years
- Over the entire AL range:
 - Hill-RBF had the lowest MAE
 - No statistically significant difference in accuracy among the three formulae
- For AL subgroup analyses:
 - Hill-RBF had the lowest MAE for all three AL subgroups
 - No statistically significant difference in accuracy among the three formulae in all subgroups
 - All three formulae were least accurate in short eyes and most accurate in medium eyes

- For detailed tables of patient demographics and refractive outcomes, scan:

Table 1. Patient Demographics

Table 2. Refractive Outcomes



Conclusion

- The three formulae produced comparable outcomes for all ALs
 - Previous studies have demonstrated superiority of Barrett Universal II in most ALs
- Our MAEs for all formulae were comparable to values obtained in previous non-teaching hospital studies
- Short eyes posed the greatest challenge to predicting postoperative refraction error

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