



Comparison of the Barrett Universal II Formula to Older Generation Formulae for Pediatric Cataract Surgery

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Background

- The prediction accuracy in children is significantly lower than adults
- New generation formulae, such as the Barrett Universal II formula, have been reported to have the highest accuracy across all axial lengths in adult patients



Purpose

To compare the accuracy of the Barrett Universal II formula to previous generation formulae in calculating IOL power following pediatric cataract extraction



Methods

Retrospective cohort

- 2012 - 2018
- The Hospital for Sick Children, Toronto, Canada

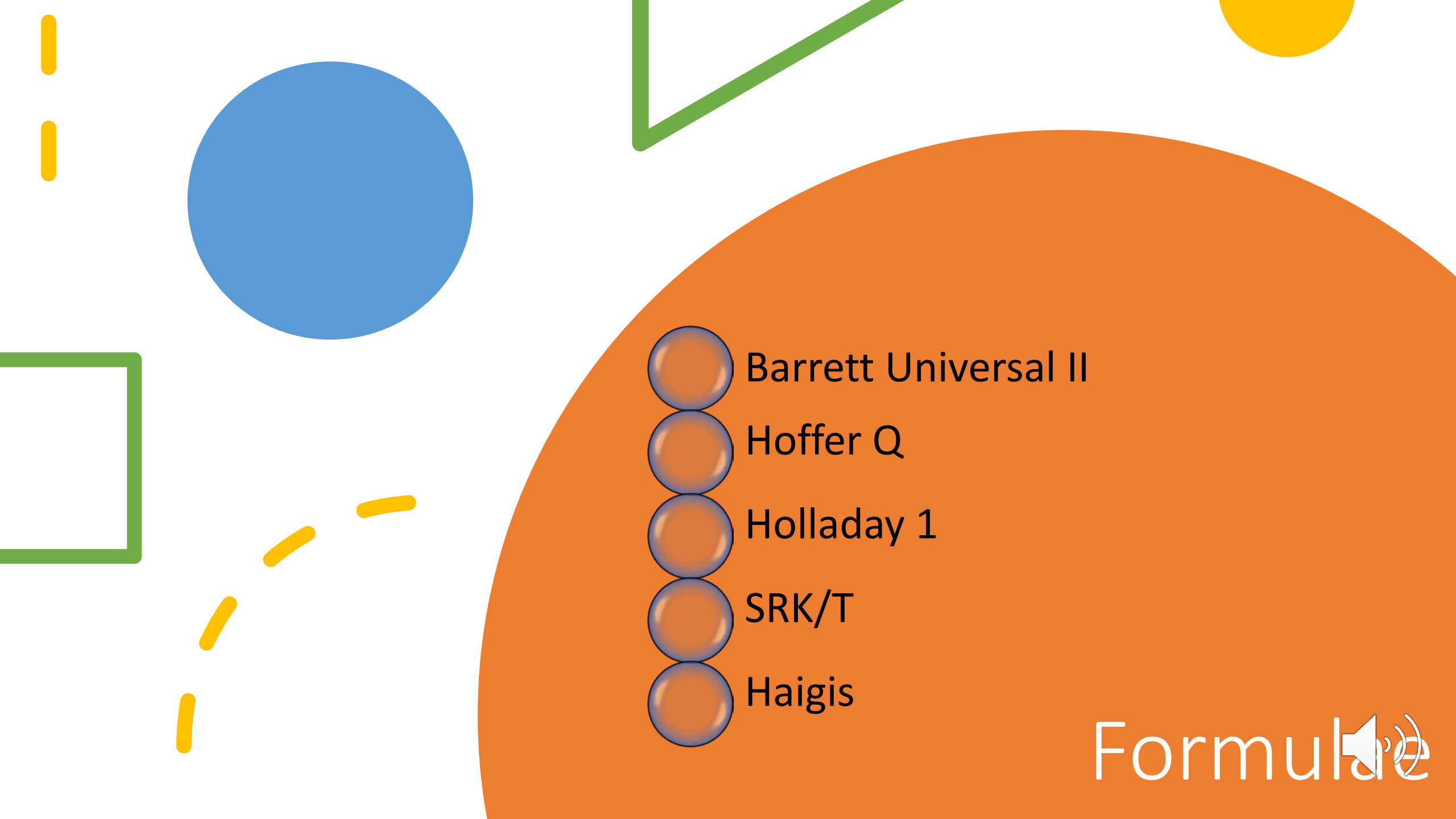
Inclusion criteria

- Pediatric population >6 months
- SA60AT or MA60AC IOLs
- Refraction 1-3 months post-operatively

Exclusion

- Traumatic cataract
- Previous corneal transplantation
- Persistent fetal vasculature
- Intraoperative complications
- Sulcus IOL implantation
- Eyes without primary IOL implantation



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- Barrett Universal II
 - Hoffer Q
 - Holladay 1
 - SRK/T
 - Haigis

Formulare 

Results



Male, %	59.1%
RE, %	53.0%
Age (months), median [IQR, range]	74.6 [38.8 – 111.3, 10.7 – 210.2]
AL (mm), mean ± SD [range]	22.29 ± 1.64 [19.45 – 27.81]
K1 (D), mean ± SD [range]	42.85 ± 1.78 [39.37 – 46.49]
K2 (D), mean ± SD [range]	44.80 ± 2.26 [40.81 – 51.75]
ACD (mm), mean ± SD [range]	3.59 ± 0.44 [2.35 – 4.48]
Corneal Diameter (mm), median [IQR, range]	12.00 [11.7 – 12.25, 10.5 – 13.1]
Lens Thickness (mm), median [IQR, range]	3.41 [3.26 – 3.73, 1.71 – 6.52]
IOL Model, _n (SA60AT / MA60AC)	41 / 25
IOL Power (D), mean ± SD [range]	23.3 ± 5.1 [12.0 – 39.0]
Postoperative SE Refraction (D), median [IQR, range]	0.5 [(-0.5) – (+2.25), (-2.625) – (+5.125)]

Baseline Characteristics

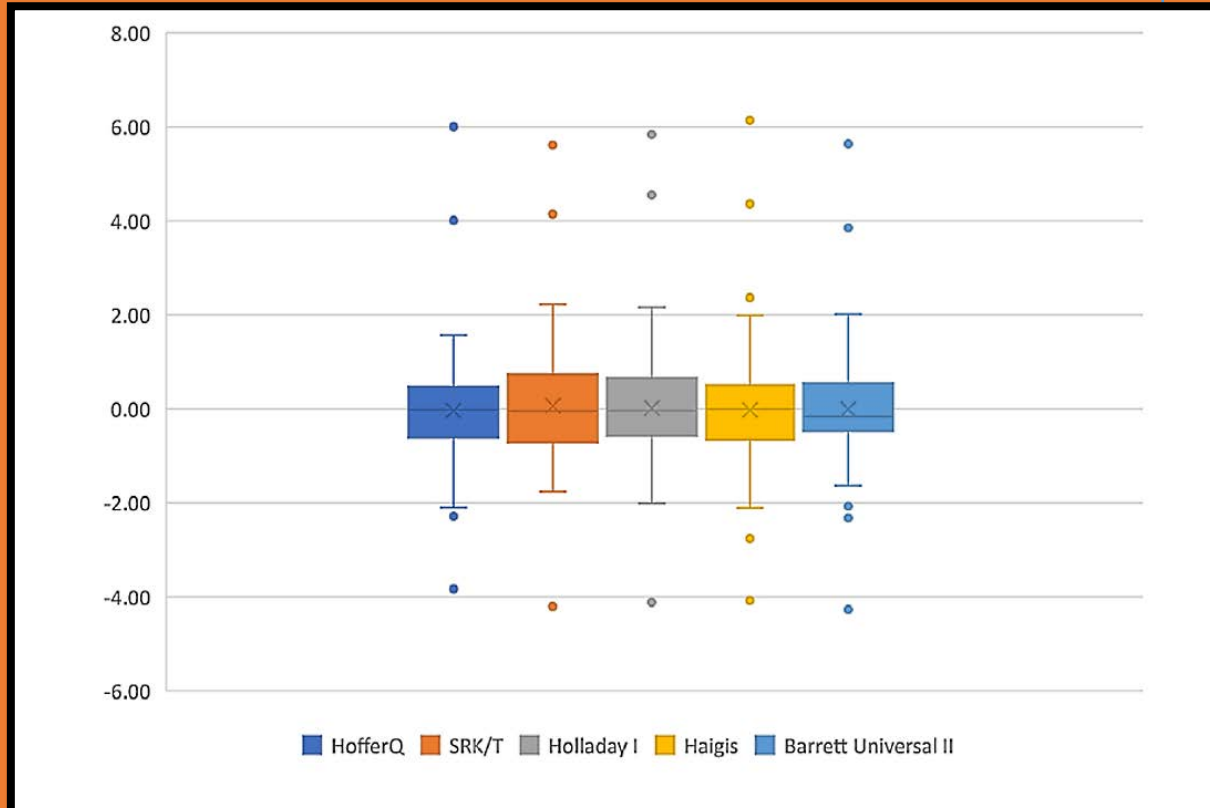


Constants' Optimization

Constant (formula)	Optimized (ULIB recommended)	
	SA60AT*	MA60AC*
Lens factor (Barrett Universal II)	1.46 (1.78)	1.65 (1.99)
pACD (Hoffer Q)	5.26 (5.44)	5.31 (5.67)
Surgeon factor (Holladay I)	1.54 (1.67)	1.58 (1.90)
A-constant (SRK/T)	118.72 (118.8)	118.78 (119.2)
A0, A1, A2 (Haigis)	0.756, 0.4, 0.1 (-0.111, 0.249, 0.179)	0.752, 0.4, 0.1 (0.229, 0.011, 0.205)



Predicted Error after Optimization

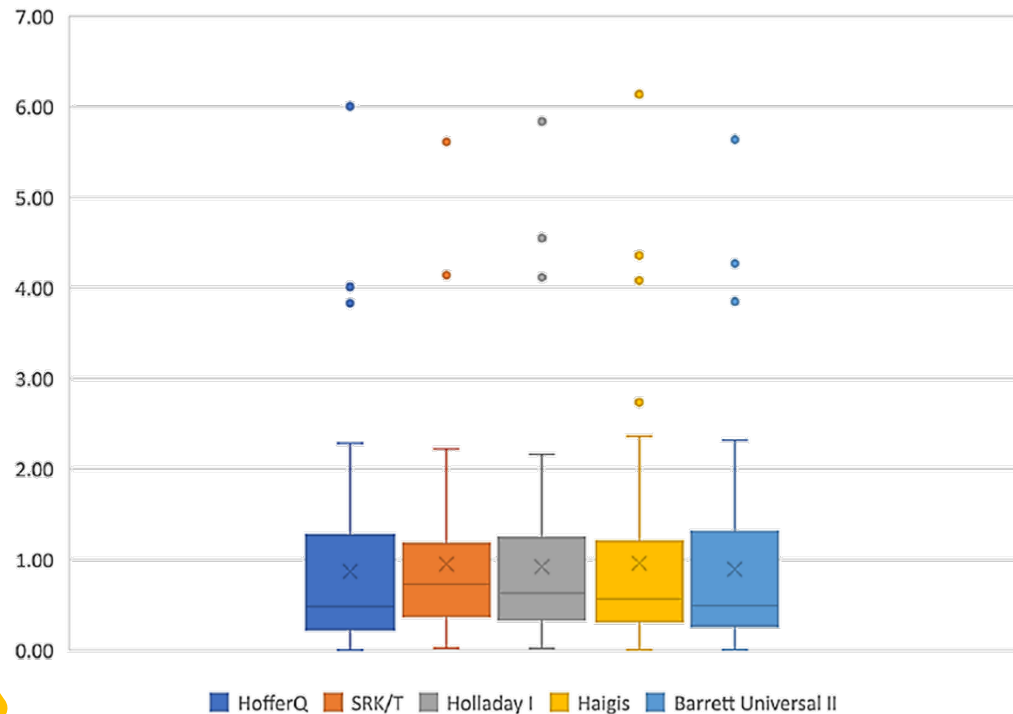


	Optimized Constants Mean \pm SD	ULIB Recommended Constants Mean \pm SD	p-value
Barrett Universal II	0.02 \pm 1.35	-0.49 \pm 1.34	<0.001
Hoffer Q	-0.05 \pm 1.35	-0.42 \pm 1.34	<0.001
Holladay I	0.01 \pm 1.38	-0.29 \pm 1.37	<0.001
SRK/T	0.07 \pm 1.37	-0.14 \pm 1.35	<0.001
Haigis	-0.03 \pm 1.46	-0.62 \pm 1.41	<0.001



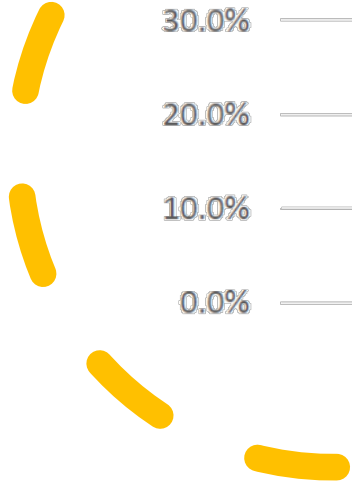
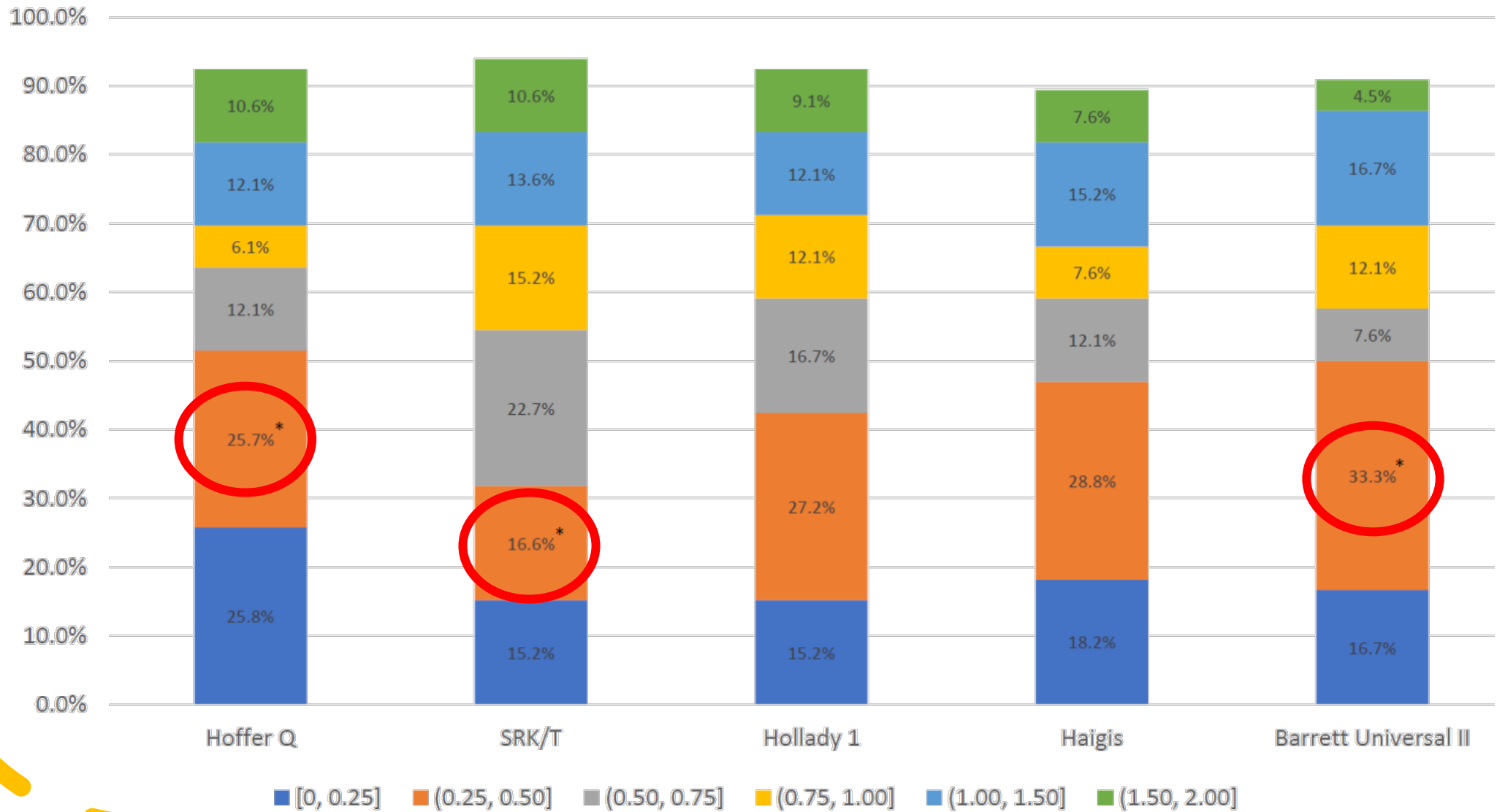
Absolute Predicted Refraction Errors

p=0.205



	Mean ± SD
	0.89 ± 1.00
Barrett Universal II	0.49 (0.29 – 1.26)
	0.87 ± 1.03
Hoffer Q	0.48 (0.23 – 1.27)
	0.92 ± 1.02
Holladay I	0.61 (0.34 – 1.25)
	0.95 ± 0.98
SRK/T	0.74 (0.37 – 1.20)
	0.96 ± 1.10
Haigis	0.58 (0.31 – 1.21)





Conclusions

This is the first study to show the results of the BU11 formula after constant optimization in the pediatric age group

The BU11 formula outperformed the SRK/T formula

Comparable accuracy to other tested formulae



Thank you!

