Utilizing a Systematic Approach to Fitting Gas-Permeable Contact Lenses

By

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ABSTRACT

Background: The fit of a gas-permeable contact lens requires a thorough examination of patients to ultimately achieve a proper fit for optimal visual outcomes and patient satisfaction. Imperative data for determination of the fit of a gas-permeable contact lens includes determining the diameter of lens, base curve, evaluation of the fit, and power necessary which are all utilized with intentions to achieve an aligned fit with superb visual acuity. How will a succinct and systematic contact lens card guide an optometric clinician in the selection of an ideal gas-permeable for a patient? Methods: The current Michigan College of Optometry Gas-Permeable Contact Lens Card will be evaluated and formatting and content changes will be made. The original and updated cards will be compared amongst a designated population of 20-30 optometric clinicians, including students and practicing optometrists, with specific cases to be worked through. A rating scale consisting of convenience, ease of use, accuracy, etc. will be completed by the subjects, and data will be analyzed as to which card is recognized as a better clinical tool. Results: The results of this study will focus on convenience, ease of use, accuracy, and other factors contributing to the success of the practitioner utilizing the gas-permeable contact lens card in achieving a successful fit for each case patient. The results will determine that a succinct and systematic contact lens card is necessary and valuable to achieve success and patient satisfaction in the fit of a gas-permeable contact lens. Conclusions: The clinical relevance of this project will impact efficiency, practitioner confidence, patient satisfaction, and overall success with gas-permeable contact lenses in practice. Having a systematic card to use as a clinical tool will serve as an invaluable pocket tool for achieving success in contact lens practice.

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CHAPTER 1

INTRODUCTION OF GAS-PERMEABLE LENSES IN OPTOMETRIC PRACTICE

Gas-permeable contact lenses are an essential tool for each optometric provider to be successful at fitting. These specialty contact lenses are oftentimes utilized for correcting an assortment of refractive errors, as well as greatly improving visual acuity for patients with keratoconus and other corneal conditions. A variety of strategies have been utilized to achieve an optimal fitting gas-permeable contact lens. Oftentimes, practitioners in a bustling practice setting utilize an empirical approach in which lenses are ordered by parameters including keratometry and power, however, sometimes practitioners must rely on a diagnostic fitting approach to ensure patient success with the contact lenses.[6]

Patients with irregular corneal astigmatism due to corneal conditions such as keratoconus, pellucid marginal degeneration, or those who are post-surgical are oftentimes more successful with a diagnostic fit approach, as the eye care professional is able to assess the lens-cornea fit relationship and lid interaction.[6,8] A diagnostic fit approach is essential for first time gas-permeable lens wearers to begin the adaptation process for the fit of the lenses, and for the optometrist to assess lid tension, movement, wetting of the lens and centration among other factors.[8] Keratoconic corneas require careful assessment of the lens-cornea fit relationship, as most successful fits possess a three-point touch, otherwise known as a divided support relationship.[7] Thus a diagnostic fit approach is better utilized in both scenarios to reduce chair time for the patient/provider, and to achieve a successful fit at a faster rate within a clinical setting.

The purpose of this study is to enhance the confidence and improve efficiency of an eye care professional in diagnostically fitting gas-permeable contact lenses by utilizing a more systematic approach with an updated contact lens fitting guide.

CHAPTER 2

METHODS

Evaluation Methods

The determination for making essential and valuable improvements to the current Michigan College of Optometry diagnostic gas-permeable contact lens fitting guide required feedback from multiple parties, including faculty in the contact lens department, contact lens residents, and current and former optometric students. The method employed to thoroughly and critically evaluate the card highlighted the strengths, weakness, opportunities, and threats through a commonly preferred SWOT analysis. See table A included below for a brief evaluation of each category.

STRENGTHS	WEAKNESSES
Familiarity	Layout
Convenience	Repeatability
	Poor flow
OPPORTUNITIES	**THREATS**
Systematic fitting method	Online Calculators
Maximize efficiency	Empirical Fitting
Improve accuracy	Soft contact lenses
Improve clinician confidence	Scleral contact lenses

Table A: featuring SWOT analysis

The original card possesses the strengths of familiarity amongst current clinicians with its appropriate use and how to ensure an aligned, ideal fit. It is also convenient for practitioners to continue utilizing the current card, as opposed to learning how to appreciate and use a new layout. The weaknesses of the original card is that it is difficult to follow in a stepwise fashion for appropriately fitting patients, which results in a lack of efficiency, accuracy, and confidence for both practitioner and patient. By making improvements in the overall flow of the card utilizing a stepwise approach, better repeatability and accuracy can be achieved. This is

especially beneficial for optometric students learning to fit gas-permeable lenses on patients who rely greatly on repetition for fitting to be successful. The empirical method of fitting is still favorable for some patients, and many practitioners are enticed to continue utilizing this method, however, a diagnostic approach has many benefits. According to expert gas-permeable lens fitters, diagnostic fitting allows the practitioner to fine-tune lens parameters prior to ordering, and it also allows first time lens wearers to experience the sensation associated with wearing this lens modality.[2]

Redesign Methods

Determining the appropriate flow of a fitting card for gas-permeable lenses warranted following a method that maximizes positive patient outcomes. Through clinical experience and previous problems encountered with the original contact lens design, new drafts were designed, critiqued, and improved until the final design was agreed upon.

Practitioner knowledge and experience designated starting with a close evaluation of the patient's lid position and apposition against the globe. This is pertinent data to drive the selection of an appropriate diameter to achieve a central fit over the visual axis. The two choices to select which diameter lens for a patient is whether the lens will be lid-attached or interpalpebral. Optometric students and seasoned practitioners are trained to recognize that if the upper eyelids cover the limbus and encroach upon the iris, a lid-attached fit will be most successful, and in order to achieve this fit, diameters of 9.5mm and larger are chosen. When the upper eyelid does not cover the limbus, an interpalpebral fit is preferred, and is best accomplished with diameters less than 9.4mm. Although the exact overall diameter is not selected in this step, it is important to establish an estimate before moving forward.

The second step in lens selection is to choose an appropriate base curve based primarily on keratometry values. The chart from the original card was transferred to the new card, however, improvements of including two separate categories based on interpalpebral or lid-attached fit were delineated. This simple addition will help expedite the process and allow greater accuracy for the practitioner with appropriate base curve selection, whereas on the past card, practitioners had to guesstimate.

The third selection to be made involves selecting optic zone diameter. Depending upon the fit with relation to the lids / overall diameter in step one and the base curve selected in step two, an optic zone diameter can be determined. The optic zone diameter of a lens is responsible for carrying the crisp optics of the lens.[2] Depending on the optic zone diameter, the overall diameter of the lens is chosen utilizing the scale developed by Dr. Joshua Lotoczky.

Fourth determination of the lenses involves assessing the fit on the eye(s) of the patient using fluorescein dye. Various fits are depicted on page 10, and the practitioner can determine from close evaluation using a slit lamp what changes are necessary to make to the base curve of the lens if any. If central bearing or a flat fit are observed, steepening the base curve in 0.50 diopter increments and adjusting the final power of the lens (to come in step 5) are necessary. If central pooling or a steep fit are observed, flattening the base curve in 0.50 diopter increment steps and adjusting the final power of the lens (to come in step 5) are necessary.

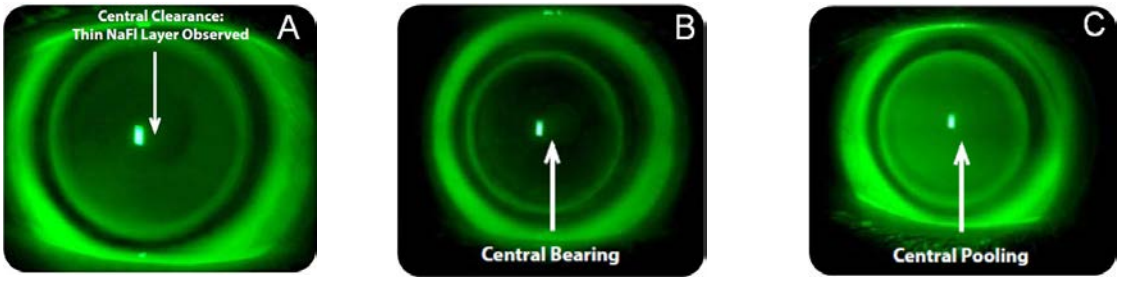
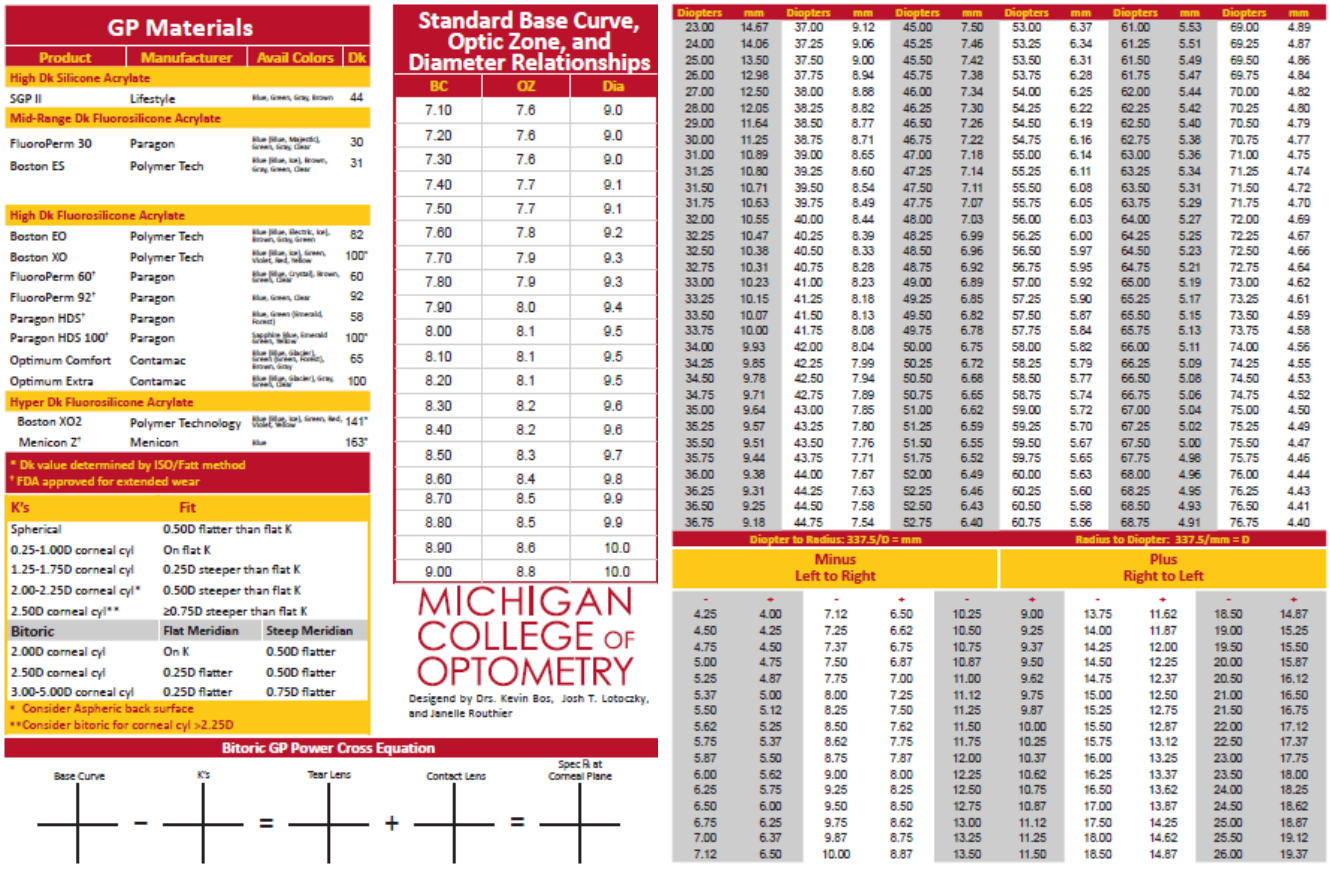


Figure A: Fluorescein patterns of flat (A), aligned (B), and steep (C) fits.[2]

The final step of the lens selection process involves determination of power for the patient. Many practitioners utilizing a diagnostic approach over-refract with the patient wearing the contact lenses to compare to the patient's vertexed spectacle prescription for final lens ordering.[2] It is important for eye care professionals to remember that if modifications to the base curve were made, an appropriate adjustment in final lens power is also necessary. For instance, if the base curve was steepened by 0.50 diopters, the power of the lens must now be 0.50 diopters more minus or less plus. On the contrary, if the base curve was flattened by 0.50 diopters, the power of the lens must now be 0.50 diopters more plus or less minus. A simple pneumatic to remember the change in power based on change in base curve is "SAM-FAP," steep add minus, flat add plus.

Use of Current Contact Lens Card



GP Materials

Product	Manufacturer	Avail Colors	Dk
High Dk Silicone Acrylate			
SGP II	Lifestyle	Blue, Green, Gray, Brown	44
Mid-Range Dk Fluorosilicone Acrylate			
FluoroPerm 30	Paragon	Blue (Blue, Majestic), Green, Gray, Clear	30
Boston ES	Polymer Tech	Blue (Blue, Ice), Brown, Gray, Green, Clear	31
High Dk Fluorosilicone Acrylate			
Boston EO	Polymer Tech	Blue (Blue, Electric, Ice), Brown, Gray, Green	82
Boston XO	Polymer Tech	Blue (Blue, Ice), Green, Violet, Red, Yellow	100*
FluoroPerm 60†	Paragon	Blue (Blue, Crystal), Brown, Green, Clear	60
FluoroPerm 92†	Paragon	Blue, Green, Clear	92
Paragon HDS†	Paragon	Blue, Green (Emerald, Forest)	58
Paragon HDS 100†	Paragon	Sapphire Blue, Emerald Green, Yellow	100*
Optimum Comfort	Contamac	Blue (Blue, Glacier), Green (Green, Hunter), Brown, Gray	65
Optimum Extra	Contamac	Blue (Blue, Glacier), Gray, Green, Clear	100
Hyper Dk Fluorosilicone Acrylate			
Boston XO2	Polymer Technology	Blue (Blue, Ice), Green, Red, Violet, Yellow	141*
Menicon Z†	Menicon	Blue	163*

* Dk value determined by ISO/Fatt method
† FDA approved for extended wear

K's	Fit
Spherical	0.50D flatter than flat K
0.25-1.00D corneal cyl	On flat K
1.25-1.75D corneal cyl	0.25D steeper than flat K
2.00-2.25D corneal cyl*	0.50D steeper than flat K
2.50D corneal cyl**	≥0.75D steeper than flat K

Bitoric	Flat Meridian	Steep Meridian
2.00D corneal cyl	On K	0.50D flatter
2.50D corneal cyl	0.25D flatter	0.50D flatter
3.00-5.00D corneal cyl	0.25D flatter	0.75D flatter

* Consider Aspheric back surface
**Consider bitoric for corneal cyl >2.25D

Standard Base Curve, Optic Zone, and Diameter Relationships

BC	OZ	Dia
7.10	7.6	9.0
7.20	7.6	9.0
7.30	7.6	9.0
7.40	7.7	9.1
7.50	7.7	9.1
7.60	7.8	9.2
7.70	7.9	9.3
7.80	7.9	9.3
7.90	8.0	9.4
8.00	8.1	9.5
8.10	8.1	9.5
8.20	8.1	9.5
8.30	8.2	9.6
8.40	8.2	9.6
8.50	8.3	9.7
8.60	8.4	9.8
8.70	8.5	9.9
8.80	8.5	9.9
8.90	8.6	10.0
9.00	8.8	10.0

MICHIGAN COLLEGE OF OPTOMETRY

Designed by Drs. Kevin Bos, Josh T. Lotoczky, and Janelle Routhier

Bitoric GP Power Cross Equation

Base Curve − K's = Tear Lens + Contact Lens = Spec R at Corneal Plane

Diopters	mm	Diopters	mm	Diopters	mm	Diopters	mm	Diopters	mm	Diopters	mm
23.00	14.67	37.00	9.12	45.00	7.50	53.00	6.37	61.00	5.53	69.00	4.89
24.00	14.06	37.25	9.06	45.25	7.46	53.25	6.34	61.25	5.51	69.25	4.87
25.00	13.50	37.50	9.00	45.50	7.42	53.50	6.31	61.50	5.49	69.50	4.86
26.00	12.98	37.75	8.94	45.75	7.38	53.75	6.28	61.75	5.47	69.75	4.84
27.00	12.50	38.00	8.88	46.00	7.34	54.00	6.25	62.00	5.44	70.00	4.82
28.00	12.05	38.25	8.82	46.25	7.30	54.25	6.22	62.25	5.42	70.25	4.80
29.00	11.64	38.50	8.77	46.50	7.26	54.50	6.19	62.50	5.40	70.50	4.79
30.00	11.25	38.75	8.71	46.75	7.22	54.75	6.16	62.75	5.38	70.75	4.77
31.00	10.89	39.00	8.65	47.00	7.18	55.00	6.14	63.00	5.36	71.00	4.75
31.25	10.80	39.25	8.60	47.25	7.14	55.25	6.11	63.25	5.34	71.25	4.74
31.50	10.71	39.50	8.54	47.50	7.11	55.50	6.08	63.50	5.31	71.50	4.72
31.75	10.63	39.75	8.49	47.75	7.07	55.75	6.05	63.75	5.29	71.75	4.70
32.00	10.55	40.00	8.44	48.00	7.03	56.00	6.03	64.00	5.27	72.00	4.69
32.25	10.47	40.25	8.39	48.25	6.99	56.25	6.00	64.25	5.25	72.25	4.67
32.50	10.38	40.50	8.33	48.50	6.96	56.50	5.97	64.50	5.23	72.50	4.66
32.75	10.31	40.75	8.28	48.75	6.92	56.75	5.95	64.75	5.21	72.75	4.64
33.00	10.23	41.00	8.23	49.00	6.89	57.00	5.92	65.00	5.19	73.00	4.62
33.25	10.15	41.25	8.18	49.25	6.85	57.25	5.90	65.25	5.17	73.25	4.61
33.50	10.07	41.50	8.13	49.50	6.82	57.50	5.87	65.50	5.15	73.50	4.59
33.75	10.00	41.75	8.08	49.75	6.78	57.75	5.84	65.75	5.13	73.75	4.58
34.00	9.93	42.00	8.04	50.00	6.75	58.00	5.82	66.00	5.11	74.00	4.56
34.25	9.85	42.25	7.99	50.25	6.72	58.25	5.79	66.25	5.09	74.25	4.55
34.50	9.78	42.50	7.94	50.50	6.68	58.50	5.77	66.50	5.08	74.50	4.53
34.75	9.71	42.75	7.89	50.75	6.65	58.75	5.74	66.75	5.06	74.75	4.52
35.00	9.64	43.00	7.85	51.00	6.62	59.00	5.72	67.00	5.04	75.00	4.50
35.25	9.57	43.25	7.80	51.25	6.59	59.25	5.70	67.25	5.02	75.25	4.49
35.50	9.51	43.50	7.76	51.50	6.55	59.50	5.67	67.50	5.00	75.50	4.47
35.75	9.44	43.75	7.71	51.75	6.52	59.75	5.65	67.75	4.98	75.75	4.46
36.00	9.38	44.00	7.67	52.00	6.49	60.00	5.63	68.00	4.96	76.00	4.44
36.25	9.31	44.25	7.63	52.25	6.46	60.25	5.60	68.25	4.95	76.25	4.43
36.50	9.25	44.50	7.58	52.50	6.43	60.50	5.58	68.50	4.93	76.50	4.41
36.75	9.18	44.75	7.54	52.75	6.40	60.75	5.56	68.75	4.91	76.75	4.40

Diopter to Radius: 337.5/D = mm — Radius to Diopter: 337.5/mm = D

Minus Left to Right				Plus Right to Left					
-	+	-	+	-	+	-	+	-	+
4.25	4.00	7.12	6.50	10.25	9.00	13.75	11.62	18.50	14.87
4.50	4.25	7.25	6.62	10.50	9.25	14.00	11.87	19.00	15.25
4.75	4.50	7.37	6.75	10.75	9.37	14.25	12.00	19.50	15.50
5.00	4.75	7.50	6.87	10.87	9.50	14.50	12.25	20.00	15.87
5.25	4.87	7.75	7.00	11.00	9.62	14.75	12.37	20.50	16.12
5.37	5.00	8.00	7.25	11.12	9.75	15.00	12.50	21.00	16.50
5.50	5.12	8.25	7.50	11.25	9.87	15.25	12.75	21.50	16.75
5.62	5.25	8.50	7.62	11.50	10.00	15.50	12.87	22.00	17.12
5.75	5.37	8.62	7.75	11.75	10.25	15.75	13.12	22.50	17.37
5.87	5.50	8.75	7.87	12.00	10.37	16.00	13.25	23.00	17.75
6.00	5.62	9.00	8.00	12.25	10.62	16.25	13.37	23.50	18.00
6.25	5.75	9.25	8.25	12.50	10.75	16.50	13.62	24.00	18.25
6.50	6.00	9.50	8.50	12.75	10.87	17.00	13.87	24.50	18.62
6.75	6.25	9.75	8.62	13.00	11.12	17.50	14.25	25.00	18.87
7.00	6.37	9.87	8.75	13.25	11.25	18.00	14.62	25.50	19.12
7.12	6.50	10.00	8.87	13.50	11.50	18.50	14.87	26.00	19.37

Figure B: above features original contact lens card modality including front side optic zone, diameter, and base curve selections (left) and appropriate vertex and power compensations (right).

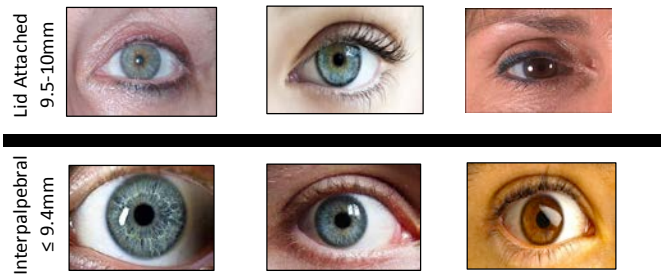
Figure C: Updated Contact Lens Card [Front Side]

Michigan College of Optometry Gas Permeable Contact Lens Card

Steps in GP Lens Selection: Diameter -> Base Curve -> Evaluate Fit -> Power

1. Choose GP Lens Diameter

Determined from: lid position



If a change in diameter is necessary, must change by 0.3mm to have a significant impact

2. Choose Appropriate GP Base Curve

Determined from: keratometry, lid to cornea position, fluorescein pattern, and desired lens movement

Keratometry Values	Lid Attached Fit	Interpalpebral Fit
Spherical	0.50 D flatter than flat K	On flat K
0.25 - 1.00 D corneal cyl	On flat K	0.25 to 0.50 D steeper than flat K
1.25 - 1.75 D corneal cyl	0.25 D steeper than flat K	0.50 to 0.75 D steeper than flat K
2.00 - 2.25 D corneal cyl*	0.50 D steeper than flat K	0.75 to 1.00 D steeper than flat K
2.50 D corneal cyl**	≥0.75 D steeper than flat K	≥1.00 D steeper than flat K

Bitoric	Flat Meridian	Steep Meridian
2.00 D corneal cyl	On K	0.50 D flatter
2.50 D corneal cyl	0.25 D flatter	0.50 D flatter
3.00 - 5.00 D corneal cyl	0.25 D flatter	0.75 D flatter

If a change in base curve is necessary, utilize SAM - FAP (Steep add minus, Flat add plus)

* Consider Aspheric back surface

** Consider Bitoric for corneal cyl >2.25 D

3. Select Optic Zone Diameter and Overall Diameter

If fitting a lid attached lens

Desired Base Curve	<7.6mm (>44.5D)	7.6 ≥ but < 8.2 (44.5-41D)	≥8.2 (<41D)
	9.5 OAD, 7.6 OZD	9.7 OAD, 8.1 OZD	10.0 OAD, 8.4 OZD

If fitting an interpalpebral lens

Desired Base Curve	<7.6mm (>44.5D)	7.6 ≥ but < 8.2 (44.5-41D)	≥8.2 (<41D)
	9.0 OAD, 7.6 OZD	9.2 OAD, 7.8 OZD	9.4 OAD, 8.0 OZD

4. Evalute fit if a trial lens is available

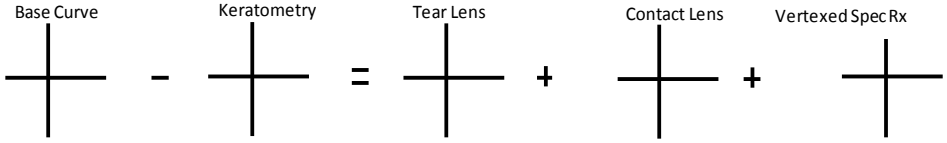
•Flat fit: central bearing -> steepen base curve and adjust power dioptrically by magnitude steepening

•Steep fit: central pooling -> flatten base curve and adjust power dioptrically by magnitude flattening

5. Select Proper Power of GP Lens

Determined from: adjustments in base curve based on fit, and vertexed spectacle lens prescription

Bitoric GP Power Cross Equation



Created by: Dr. Josh T. Lotoczky & Hannah Rillema (4th Year Optometry Student)

Michigan College of Optometry Gas Permeable Contact Lens Card									
Conversion of Dioptric to Millimeter Value of Base Curves									
Diopters	mm	Diopters	mm	Diopters	mm	Diopters	mm	Diopters	mm
23.00	14.67	40.00	8.44	49.00	6.89	60.00	5.63	69.00	4.89
24.00	14.06	40.25	8.39	49.25	6.85	60.25	5.60	69.25	4.87
25.00	13.50	40.50	8.33	49.50	6.82	60.50	5.58	69.50	4.86
26.00	12.98	40.75	8.28	49.75	6.78	60.75	5.56	69.75	4.84
27.00	12.50	41.00	8.23	50.00	6.75	61.00	5.53	70.00	4.82
28.00	12.05	41.25	8.18	50.25	6.72	61.25	5.51	70.25	4.80
29.00	11.64	41.50	8.13	50.50	6.68	61.50	5.49	70.50	4.79
30.00	11.25	41.75	8.08	50.75	6.65	61.75	5.47	70.75	4.77
31.00	10.89	42.00	8.04	51.00	6.62	62.00	5.44	71.00	4.75
31.25	10.80	42.25	7.99	51.25	6.59	62.25	5.42	71.25	4.74
31.50	10.71	42.50	7.94	51.50	6.55	62.50	5.40	71.50	4.72
31.75	10.63	42.75	7.89	51.75	6.52	62.75	5.38	71.75	4.70
32.00	10.55	43.00	7.85	52.00	6.49	63.00	5.36	72.00	4.69
32.25	10.47	43.25	7.80	52.25	6.46	63.25	5.34	72.25	4.67
32.50	10.38	43.50	7.76	52.50	6.43	63.50	5.31	72.50	4.66
32.75	10.31	43.75	7.71	52.75	6.40	63.75	5.29	72.75	4.64
33.00	10.23	44.00	7.67	53.00	6.37	64.00	5.27	73.00	4.62
33.25	10.15	44.25	7.63	53.25	6.34	64.25	5.25	73.25	4.61
33.50	10.07	44.50	7.58	53.50	6.31	64.50	5.23	73.50	4.59
33.75	10.00	44.75	7.54	53.75	6.28	64.75	5.21	73.75	4.58
34.00	9.93	45.00	7.50	54.00	6.25	65.00	5.19	74.00	4.56
34.25	9.85	45.25	7.46	54.25	6.22	65.25	5.17	74.25	4.55
34.50	9.78	45.50	7.42	54.50	6.19	65.50	5.15	74.50	4.53
34.75	9.71	45.75	7.38	54.75	6.16	65.75	5.13	74.75	4.52
35.00	9.64	46.00	7.34	55.00	6.14	66.00	5.11	75.00	4.50
35.25	9.57	46.25	7.30	55.25	6.11	66.25	5.09	75.25	4.49
35.50	9.51	46.50	7.26	55.50	6.08	66.50	5.08	75.50	4.47
35.75	9.44	46.75	7.22	55.75	6.05	66.75	5.06	75.75	4.46
36.00	9.38	47.00	7.18	56.00	6.03	67.00	5.04	76.00	4.44
36.25	9.31	47.25	7.14	56.25	6.00	67.25	5.02	76.25	4.43
36.50	9.25	47.50	7.11	56.50	5.97	67.50	5.00	76.50	4.41
36.75	9.18	47.75	7.07	56.75	5.95	67.75	4.98	76.75	4.40
37.00	9.12	48.00	7.03	57.00	5.92	68.00	4.96	77.00	4.38
37.25	9.06	48.25	6.99	57.25	5.90	68.25	4.95	77.25	4.37
37.50	9.00	48.50	6.96	57.50	5.87	68.50	4.93	77.50	4.35
37.75	8.94	48.75	6.92	57.75	5.84	68.75	4.91	77.75	4.34

Vertex Prescription									
Myopia: Left to Right					Hyperopia: Right to Left				
(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)	(-)	(+)
4.25	4.00	7.12	6.50	10.25	9.00	13.75	11.62	18.50	14.87
4.50	4.25	7.25	6.62	10.50	9.25	14.00	11.87	19.00	15.25
4.75	4.50	7.37	6.75	10.75	9.37	14.25	12.00	19.50	15.50
5.00	4.75	7.50	6.87	10.87	9.50	14.50	12.25	20.00	15.87
5.25	4.87	7.75	7.00	11.00	9.62	14.75	12.37	20.50	16.12
5.37	5.00	8.00	7.25	11.12	9.75	15.00	12.50	21.00	16.50
5.50	5.12	8.25	7.50	11.25	9.87	15.25	12.75	21.50	16.75
5.62	5.25	8.50	7.62	11.50	10.00	15.50	12.87	22.00	17.12
5.75	5.37	8.62	7.75	11.75	10.25	15.75	13.12	22.50	17.37
5.87	5.50	8.75	7.87	12.00	10.37	16.00	13.25	23.00	17.75
6.00	5.62	9.00	8.00	12.25	10.62	16.25	13.37	23.50	18.00
6.25	5.75	9.25	8.25	12.50	10.75	16.50	13.62	24.00	18.25
6.50	6.00	9.50	8.50	12.75	10.87	17.00	13.87	24.50	18.62
6.75	6.25	9.75	8.62	13.00	11.12	17.50	14.25	25.00	18.87
7.00	6.37	9.87	8.75	13.25	11.25	18.00	14.62	25.50	19.12
7.12	6.50	10.00	8.87	13.50	11.50	18.50	14.87	26.00	19.37

Created by: Dr. Joshua Lotoczky & Hannah Rillema (3rd Year Optometry Student)

Figure D: Updated Contact Lens Card [Backside]

CHAPTER 3

FUTURE RESEARCH

Further research will include distributing a survey to evaluate the positive outcomes associated with improvements to the coding card. With IRB approval, a population of approximately 80 doctoral candidates as well as faculty at the Michigan College of Optometry will be selected to use the original diagnostic coding card to fit four sample patients with appropriate gas-permeable contact lenses, and then utilize the newly updated diagnostic coding card to fit the same four sample patients with appropriate gas-permeable contact lenses. A comparison survey evaluating clinical efficiency, accuracy, confidence, and likelihood of utilizing the updated version of the diagnostic fitting card in the future will be scored on a ten point scale. The data will be interpreted to deem the new card as the standard reference tool for private practitioners, contact lens fitting specialists, and doctoral candidates and faculty members at the Michigan College of Optometry.

Continuous improvements in gas-permeable lens designs and warrant revisiting of the diagnostic fitting card in the future. Many practitioners rely solely on empirical fitting of gas-permeable contact lenses for sake of managing chair cost and maximizing patient satisfaction with time allotted per appointment, however, diagnostic fitting is oftentimes necessary for difficult fits, such as for irregular corneas. Thus, the diagnostic card serves its purpose as a nominal reference tool for practitioners with various skill levels, from novice to expert. This diagnostic card should provide many eye care practitioners with an abundance of confidence, maximal efficiency, and exceptional accuracy if referenced correctly.

CHAPTER 4

DISCUSSION

Utilizing a systematic approach to fitting gas-permeable contact lens is helpful for each eye care professional to obtain an optimal fit, and for the patient to achieve clear vision and comfort in the lenses.

Although soft contact lenses are much more popular in a variety of practice settings, gas-permeable lenses have still been proven to have a lower incidence of infection rate, provide superb quality of vision with excellent visual acuities, and overall allow a patient to be greatly satisfied. Recent studies prove that practitioners stray away from fitting gas-permeable lenses as a first choice option for many patients, as the overall market for gas-permeable contact lens patients has dropped to only 9.4% of fittings in the United States.[5] Most practitioners prefer fitting soft contact lenses because they provide better initial patient comfort, which leads to better patient acceptance upon initial insertion. Most practitioners are thus not as accepting of gas-permeable lens modalities, as they want to retain more patients by providing great initial comfort and ensure success in long-term lens wear if chair time is devoted to fitting a patient.[3] A retrospective survey conducted on which modalities of contact lenses patients are fit with proves that soft contact lenses have greatly dominated the industry in the past five years. See table B left for a representation of the data. As

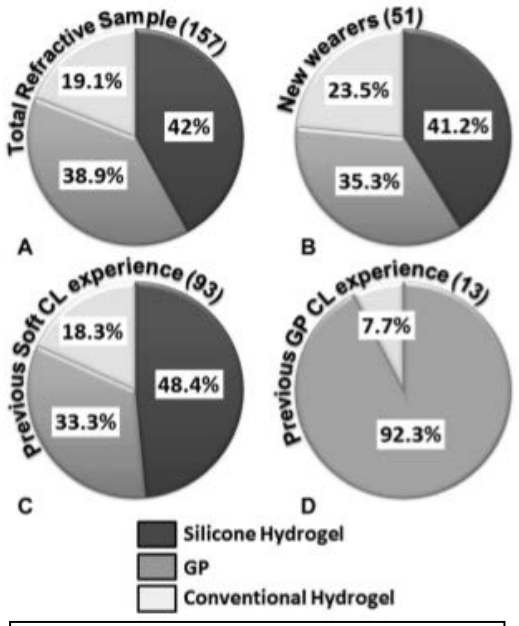


Figure E: Representation of soft and GP lens fits.[5]

depicted, only 35.3% of new contact lens wearers are successful with gas-permeable lenses, which the study verifies is partially due to practitioner confidence and comfort with the fitting modality.[5] The other factor to include in determination of the final fit for the patient is overall comfort and satisfaction on behalf of the patient, which in terms of previous gas-permeable contact lens wearers proves that if once fit in this modality, a much higher 92.3% success rate exists.[5]

Most practitioners collectively agree having a niche contact lens specialty practice exemplifies quality patient care. By utilizing a diagnostic fitting approach with gas-permeable contact lenses, practitioners are able to decrease the average return visit of a patient from 2-3 down to 1.5.[4] This statistic portrays the importance of saving chair time for practice success, improves patient loyalty, and ultimately provides the practitioner with a higher confidence level in future fits. Having the ability to reference a diagnostic fitting tool with a patient sitting in the exam chair provides the eye care professional with a consistent, systematic approach to increase the chances of a successful fit upon first selection from a diagnostic fit set and with ordering from a laboratory for dispense at the first follow-up visit.

Gas-permeable lenses are a necessary aspect to the optometric field and patients deserve to be educated on the options available with regard to achieving crisp, comfortable vision with this particular lens modality. It is ultimately up to the eye care provider to drive the conversation and to determine the appropriate fitting method, whether empirical or diagnostic, to achieve a successful fit.

CHAPTER 5

CONCLUSION

Gas-permeable contact lenses are an exceptional contact lens modality for practitioners to fit to maximally meet visual demands of various demographics of patients. A large population of patients ranging from simple myopic refractive errors, early to late presbyopes, keratoconic and other irregular cornea patients can greatly benefit from the optics available with a precisely fit lens. It is the goal of the updated gas-permeable contact lens card affiliated with the Michigan College of Optometry to provide eye care professionals with a systematic fitting guide to be efficient, accurate, and confident with fitting patients.

REFERENCES

1. Davis, Robert. “Making RGP Fitting Efficient and Successful.” *Contact Lens Spectrum.* (2000).

2. Bennett, Edward. “Clinical Manual of Contact Lenses.” P. 112-116.

3. Gill FR, Murphy PJ, Purslow C. A survey of UK practitioner attitudes to the fitting of rigid gas permeable lenses. Ophthalmic Physiol Opt 2010;30: 731–739.

4. Messer, Brook. “Build a Specialty Contact Lens Practice from the Ground Up.” Review of Optometry. November 2016.

5. Ortiz-Toquero, Sara. “Success of Rigid Gas Permeable Contact Lens Fitting.” Contact Lens Association of Ophthalmologists. Eye & Contact Lens. Volume 0, Number 0, Month 2016.

6. Silbert, Joel. “Are You Making Good Use of Diagnostic Fitting Sets?” *Review of Optometry.* (2015).

7. Sorbara, Luigina. “Correction of Keratoconus with GP Lenses.” Center for Contact Lens Research.

8. Woo, Stephanie. “Dust Off Those Diagnostic Lenses.” *Review of Cornea and Contact Lenses.* (2014).