



GUIDELINES FOR MANAGING MYOPIA: A REVIEW



Developing a standard of care will improve the lives of patients.

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Myopia has historically been optometry's bread and butter, and the bulk of the patients seen in our offices are myopic. Our understanding of myopia—one of the biggest threats to eye health in the 21st century—continues to evolve with more research. Eye care practitioners need to be on the frontlines of this progressive disease, and we need to have the knowledge to prescribe the best treatments for our young patients.

THE APPROACH

Clinicians should assess patients for myopia as early as possible, considering that this chronic progressive disease

ultimately leads to eye elongation and many associated complications. In 2021, the World Health Organization passed a resolution to encourage eye care practitioners to establish a standard of care for the management of myopia. The approach should include three pillars: mitigation, measurement, and management.¹

Eye care practitioners are now discouraged from simply correcting myopia with traditional glasses, contact lenses, or a combination of both. The evaluation and management of myopia should include public education, early screening, a discussion of individual lifestyle-based risk factors, and initiation of evidence-based treatment

for slowing the progression of myopia.

Our professional approach needs to start with public awareness. All of our patients and their families will benefit from a structured and strategic effort to increase education on myopia, associated lifestyle factors, and the opportunity to slow progression. We need to change the perception that myopia is simply a condition that requires glasses—it is so much more than that to the health and quality of life of the individual and our society.

MITIGATION

How to Detect

Without routine eye care, myopia can go undetected for several months

to years. Children do not know how to clearly explain to their parent, guardian, or teacher that they do not see well. If a child's vision is mild to moderately impaired, they may think everyone else experiences that same vision. They often do not complain until they notice that their friend can see something they cannot, such as the smartboard at school.

Parents, teachers, and school nurses play a critical role in the detection of early sight issues, as they have the opportunity to observe the child as they discern small objects at a distance. Uncorrected myopia will hinder a child's performance not only in the classroom, but also during sporting events, as it often leads to slower reaction times. Research shows that the failure to detect and treat children's vision disorders affects the rates of adult criminality, literacy, and labor productivity.² Many patients admit that they believe that glasses will harm their vision by worsening their prescription, or that they will become dependent on the glasses. Conversely, data suggest that leaving myopia uncorrected may accelerate eye elongation and, therefore, myopic progression.³ It is important to educate the public about myopia and the significant long-term visual implications to the development and progression of the disease.

TABLE 1. Cycloplegic Autorefraction

AGE (YEARS)	6	7-8	9-10	11
Refractive Error	< +0.75 D	< +0.50 D	< +0.25 D	< +0.00 D

Source: Wu PC, Chen CT, Chang LC, et al. Increased time outdoors is followed by reversal of the long-term trend to reduced visual acuity in Taiwan primary school students. *Ophthalmology*. 2020;127(11):1462-1469.

When to Screen

According to the American Optometric Association and clinical optometric consensus, the best time for a child's first eye examination with an optometrist is at 6 months of age.⁴ Children should be examined again at 3 and 5 years old and every year after. Those who are at higher risk for myopic progression may need to be evaluated more frequently. This is especially true for young myopes because myopia progresses more quickly the younger the child (eg, a 6-year-old child is likely to progress faster than a teenager).⁵

Once a child develops myopia, it almost always increases in severity. Though the definition varies, most clinicians classify low or moderate myopia as -0.50 D to -4.99 D and high myopia as -5.00 D or greater.^{6,7} In addition to dry refraction, cycloplegic refraction for children is a must; children with lower-than-expected hypermetropic refraction for a given age have a greater than 80% likelihood of myopia onset by 13 years of age (Table 1).⁸

MEASUREMENT

What to Look For

Risk factors include having myopic parents, younger age of onset, minimal time outdoors (< 2 hours a day), refractive error, and near work for longer duration or a shorter working distance.⁹⁻¹¹ These risk factors should be discussed prior to the child becoming myopic. When possible, recommend alterations in the child's lifestyle to delay the onset of myopia. This is a significant shift in our clinical approach. We should now be thinking of and educating about myopia when we see a young myopic adult planning to have children, a child who is still mildly hyperopic but on track to becoming myopic, and especially with a young child who just received a pair of low myopic prescription glasses.

Long-Term Effects

The potential health hazards that myopia poses to a patient later in life include myopic macular degeneration (MMD), staphyloma, retinal detachment, primary open-angle glaucoma, cataracts, and decreased visual acuity. The threat of disease increases with higher prescriptions.¹² Table 2 shows the likelihood of a myopic person over 60 years of age developing an eye disease compared with an emmetrope. The biggest and most devastating threats are MMD and retinal detachment because these tend to correlate with degree of myopia and longer axial lengths.¹²

MANAGEMENT

The purpose of myopia management is to slow the elongation of the eye, minimize the spectacle prescription,

AT A GLANCE

- ▶ The evaluation and management of myopia should include education, early screening, discussion of lifestyle-based risk factors, and initiation of treatment for slowing the progression of myopia.
- ▶ Discuss the risk factors of myopia with the parent/guardian before the child becomes myopic.
- ▶ Have your patients return for a myopia evaluation to ensure they understand the reason for management, the available options, and the implications of starting treatment.

TABLE 2. Risk of Complications Based on Degree of Myopia

	-0.50 TO -3.00 D	-3.00 TO -6.00 D	> -6.00 D
MMD	13.6x	73x	846x
Retinal Detachment	3.2x	8.8x	12.6x
Visual Impairment	0.9x	1.7x	5.5x

Source: Santodomingo-Rubido J, Villa-Collar C, Gilmartin B, et al. Long-term efficacy of orthokeratology contact lens wear in controlling the progression of childhood myopia. *Curr Eye Res.* 2017;42(5):713-720.

and reduce the risk of complications later in life. We need to pay particular attention to our youngest patients with myopia because the disease progresses fastest at a younger age.¹³ A patient's final prescription and axial length may be substantially lower if myopia onset is delayed, even by 1 year.¹³ Lowering final myopia by even 1.00 D can have a clinically meaningful effect on the risk of eye disease. An increase in myopia by 1.00 D is associated with a 67% increase in the

prevalence of MMD.^{14,15} Additionally, reducing myopia by 1.00 D reduces the likelihood of a patient developing MMD by approximately 40%, open-angle glaucoma by 20%, and visual impairment by 20%.^{14,15}

Evidence-Based Treatment

Evidence-based treatment options for myopia include orthokeratology to temporarily reshape the cornea, low-dose atropine drops ranging from 0.025% to 0.05%, and dual focus or

multifocal center-distance soft contact lenses. The MiSight 1 day soft contact lens (CooperVision) is the only FDA-approved lens to slow the progression of myopia in children 8 to 12 years of age at initiation of treatment.¹⁶ In several countries, novel spectacle lenses that correct peripheral defocus are available and have been shown to slow the progression of spherical equivalent refractive error and axial elongation.¹⁷ These will likely become available in the United States in the coming years.

Management Options

Eye care practitioners should schedule patients for a follow-up myopia evaluation after their comprehensive examination to ensure families and caregivers fully understand the reason for management, the available options, and the implications of starting treatment. This evaluation should include a discussion of lifestyle factors, expected progression, implications for other family members, and a selection of myopia management options. Once we have started a treatment plan, we would continue with more follow-up evaluations 1 week after the first visit and then every 3 months going forward unless a problem arises.

Clinical testing should include dry and cycloplegic refractive error analysis, keratometry, axial length measurement, and binocular performance assessment in the form of amplitude of accommodation, accommodative lag, ocular alignment, and, in certain scenarios, vergence amplitudes. Each of the available treatments can influence binocular performance. The LAMP and ATOM trials show that low-dose atropine decreases accommodative amplitude by an average of 2.00 D to 3.00 D.^{18,19} A baseline amplitude of accommodation test can help clinicians determine whether a patient is a good candidate for atropine treatment.

Orthokeratology and myopia management soft contact lens options may alter accommodative lag

MYOPIA STATS



Prevalence of myopia has nearly doubled over the past 20 years.¹



Both Eastern and Western populations exhibit the same troubling trend of increasing myopia.¹



There is no safe level of myopia; > 30% of myopic macular degeneration (MMD) occurs in people with less than -6.00 D of myopia.²



Every additional diopter of myopia increases the risk of MMD by 67%.³



Of people with an axial length > 26 mm, 25% will develop visual impairment by age 75.¹

1. Tideman JW, Snabel MC, Tedja MS, et al. Association of axial length with risk of uncorrectable visual impairment for Europeans with myopia. *JAMA Ophthalmol.* 2016;134(12):1355-1363.
2. Wong YL, Sabanayagam C, Ding Y, et al. Prevalence, risk factors, and impact of myopic macular degeneration on visual impairment and functioning among adults in Singapore. *Invest Ophthalmol Vis Sci.* 2018;59(11):4603-4613.
3. Bao J, Huang Y, Li X, et al. Myopia control with spectacle lenses with aspherical lenses: a 2-year randomized clinical trial. *Invest Ophthalmol Vis Sci.* 2021;62:2888.

“AN INCREASE IN MYOPIA BY 1.00 D IS ASSOCIATED WITH A 67% INCREASE IN THE PREVALENCE OF MMD. ADDITIONALLY, REDUCING MYOPIA BY 1.00 D REDUCES THE LIKELIHOOD OF A PATIENT DEVELOPING MMD BY APPROXIMATELY 40%, OPEN-ANGLE GLAUCOMA BY 20%, AND VISUAL IMPAIRMENT BY 20%.”

and near phoric posture.^{20,21} Baseline accommodative lag, cover test, and near vergence amplitudes can help the clinician determine which patients will be able to tolerate each treatment option.

In addition to refractive error, both keratometry and axial length are useful measures. Although axial length measurements are extremely valuable, if they are not available, refractive error and keratometry can help to predict the patient's range of axial length. If the cornea is flat, it is likely that the patient's myopia is due to axial elongation, whereas the reverse is likely true if the cornea is steep. All available myopia management options have a similar effect on the slowing of both spherical equivalent

refractive error and axial elongation.^{14,16,18,19} Therefore, it is appropriate to choose the best option for the patient based on their lifestyle and the clinical assessment.

GET INVOLVED!

Myopia is an exciting and evolving area of our profession. We have a chance to develop a standard of care that employs evidence-based practices to better the lives of our patients and citizens worldwide. Let's seize that opportunity! ■

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