Contact Lens Update
CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

Practitioners Must Embrace Myopia Management

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Mark Bullimore: Practitioners Must Embrace Myopia Management

There are three reasons eyecare practitioners need to embrace myopia management. First, myopia is becoming more prevalent.[1] Second, myopia plays an important role in visual impairment.[2] Third, practitioners have the ability to slow its progression using atropine, overnight orthokeratology, soft contact lenses, or spectacles.[3, 4] Let's consider each of these in detail.

The dramatic increase in myopia prevalence in East Asia over the past 50 years has been well documented.[5] The rising tide of myopia has been documented in other countries, although some regions appear immune or less affected.[6] In parts of China, 80% or more of 18-year-olds are myopic, with a significant proportion having high myopia—defined as –5.00 D or more.[7] This three- or four-fold increase cannot be attributed to genetics alone and must be the result of lifestyle changes.[5] While the popular narrative is to blame digital devices and screen time, it is important to remember that this tsunami of myopia primarily preceded the availability of smartphones and, in most cases, personal computers. Indeed, the evidence for an association between screen time and myopia is modest.[8] Instead, the culprit appears to be less time outdoors. Large epidemiological studies in the US, Singapore, Australia and elsewhere have shown that increased time outdoors is associated with a lower risk of myopia.[9] This protective effect transcends other risk factors, including the number of myopic parents. Clinical trials have demonstrated that increasing outdoor time results in a reduction in the incidence of myopia.[10, 11]

It has long been known that myopia increases a patient's risk of open-angle glaucoma and retinal detachment. It is now evident that the level of myopia is important, which each diopter increasing their risk by 20-30%.[2] The association of myopia with myopic maculopathy is even more pronounced, with each diopter elevating its prevalence by 60% or more.[2, 12] Myopic maculopathy (or myopic macular degeneration) is virtually untreatable and is already one of the largest causes of visual impairment. Its onset is earlier than age-related macular degeneration, affecting patients of working age, while increasing through their sixties and beyond. Recently, careful work has quantified the effect of both age and level of myopia on visual impairment.[13] Our published model shows that –5.00 D of myopia is equivalent to 11 years of aging for the risk of visual impairment.[2] Thus, a 70-year-old –5.00 D myope has the same risk of vision loss as an 81-year-old emmetrope. Further modelling demonstrates that by 2050, myopia will be responsible for around one third of all irreversible visual impairment.[14] While eradicating myopia might be considered science fiction, reducing myopia by just one diopter across the population would produce a very meaningful reduction in the prevalence of visual impairment.

So, what can be done? Twenty years ago, there weren't effective and palatable options,[15] but since then, things have changed dramatically. Atropine and bifocals have been used for decades in myopic children by a

small number of practitioners. 1% atropine is considered the most effective way to slow progression,[4] halting it in the first year of treatment.[16] Of course, the child will need progressive or bifocal spectacles to address the profound cycloplegia and preferably photochromic lenses to address the photophobia associated with chronic pupil dilation. The approach is popular in Taiwan and 0.5% atropine is recommended for early onset myopes in the Netherlands.[17] Lower concentrations of atropine have been explored in the past decade. Initial results led to 0.01% atropine being advocated and widely adopted.[18] Subsequently, multiple clinical trials have shown this concentration to be relatively ineffective, with 0.02 to 0.05% producing more robust[19] and clinically meaningful slowing of progression—0.25 mm and 0.50 D over two years.[20] Unfortunately, data are mostly from one-year trials and in East Asian children. This will change in the next year, as results from two- and three-year clinical trials in the US and Europe become available.

Orthokeratology was revolutionized some 25 years ago by the convergence of corneal topographers for assessment, reverse-geometry lens designs for centration and stability, and highly gas permeable materials that allow overnight wear. Consequently, myopia could be temporally reduced in a predictable fashion, giving lens-free clear vision throughout the day. Serendipitously, practitioners observed that myopia progression appeared to be slowed in children. This was confirmed, first by case series and, ultimately, by randomized clinical trials.[21, 22] Overnight orthokeratology has consistently been shown to slow axial elongation in young myopes by around 0.25 mm over two years—equivalent to around 0.60 D.[23]

Optical designers within the eyecare industry have been busy developing novel spectacle and soft contact lenses for myopia control. Distance-center multifocal soft lenses marketed for presbyopia have been shown to be effective at slowing progression and elongation, with higher adds being better than medium adds.[24] Greater slowing of progression can be achieved with dual focus designs, with —0.75 D and 0.3 mm over three years reported.[25] Other products are available in some markets[26, 27] with additional designs under development and evaluation.

Progressive addition spectacle lenses are ineffective for myopia control,[28] even in children with esophoria and high accommodative lag.[29] Conventional flat-top or executive bifocals may[30] or may not[31, 32] be more beneficial. Initial attempts to develop unique designs for myopia control led to concentric progressives, with increasing plus towards the periphery, that were marketed, but clinically hopeless.[33] More recently, two promising approaches have emerged. The first uses light scattering elements in the lens periphery to reduce retinal contrast. Peer-reviewed publications have yet to appear, but conference presentations suggest reasons for optimism. The second class of designs use multiple lenslets in the lens periphery, either spherical in a hexagonal matrix[34] or aspherical in a concentric pattern.[35] Two-year clinical trials show slowing of axial elongation of over 0.3 mm and slowing of myopia progression by up to 0.80 D.[35] These novel designs are already available in some regions.

In summary, practitioners have many options available to slow a child's myopia progression. In children with younger onset, fast progression, or both, combination therapy may be warranted, although the published data are mostly limited to atropine added to overnight orthokeratology.[36] Many of my colleagues start with an optical option and add atropine if the level of myopia control is less than optimal. Others consider atropine as their frontline therapy, but the child still needs an optical correction. Thus, high risk children on atropine might be best served by a myopia control contact lens or spectacle lens rather than a single vision correction.

Some practitioners may express concern about the safety of some of these approaches, but this is misplaced. First, soft contact lens safety can be enhanced with daily disposable lenses and the rates of adverse events including microbial keratitis is lower among children than in adults.[37] Likewise, overnight orthokeratology has an acceptable safety profile,[38] with recent results suggesting an incidence of microbial keratitis almost as low as daily soft lenses.[39] 1% atropine is approved by the US Food and Drug Administration for the penalization treatment of amblyopia, so lower concentrations should be considered very low risk. Furthermore, the new generation of spectacle lenses offer excellent vision, even when the child views through the peripheral lenslet zone.[40] Finally,

our quantitative analysis demonstrates that the benefits of myopia control, in terms of visual health later in life, far outweigh any risk.[2]

In addition to the aforementioned associations between myopia level and ocular disease, there are functional benefits of lower myopia, as lower myopes have better uncorrected and corrected visual acuity.[12] Furthermore, the myopic child in your chair is a future refractive surgery candidate and their visual and refractive outcomes will be better with lower presurgical myopia.[12]

Around the world, myopia control is becoming, or will soon become, the standard of care and professional associations are stressing the importance of myopia. For example, the American Academy of Ophthalmology states that "myopia is a high-priority cause of visual impairment, warranting……formulation of an action plan to address the issue."[41]

Scope of practice, regulatory considerations, and the availability of new spectacle and contact lens designs may limit a practitioner's options, but now is the time to increase your level of involvement and to commit to addressing one of the most important issues of ocular health of the 21st century.

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Paul Chamberlain's Take: With Unprecedented Knowledge and Tools, There's No Time to Lose

Researchers into myopia control like myself have a front row seat to the myopia epidemic. Global awareness and understanding have grown exponentially in recent years. Our commitment to act has to keep pace.

The science is powerful. Research has established that: (1) Myopia rates continue to increase worldwide, especially high levels of myopia; (2) The risk of future untreatable maculopathy increases dramatically with the level of myopia and is already the leading cause of untreatable vision loss in some regions; (3) Myopia progression is generally faster in younger eyes; and (4) We now have treatment options to slow myopia progression and reduce the risk of high myopia and, by inference its associated future maculopathy.

CooperVision has invested decades into myopia research and development with one goal: To provide interventions and actionable evidence of the value of myopia control interventions for children with this disease. This evidence base includes the longest-running soft contact lens myopia control clinical trial among children. Its robust findings revealed continued myopia control through six years of treatment with benefits retained post-treatment, excellent safety throughout long-term wear, and tremendous quality of life advantages with contact lenses. Eye care professionals can now be confident that children can successfully wear and benefit from a myopia control contact lens.

We're advancing ortho-k, spectacle, and soft contact lens options, and welcome others who equally value long-term, evidence-based approaches. A variety of proven, trusted tools are essential to address the diverse lifestyles and preferences of patients and families.

Myopia management must be standard of care, a position echoed by the World Council of Optometry and

prominent voices worldwide. Yet the power to make that happen—to change lives—lies with eye care professionals. Researchers have much to learn and build in this fast-paced area of research, but there is little preventing those on the frontlines from treating children today. Awareness means nothing without action. Faced with this irreversible disease, there's no time to lose.

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Noel Brennan's Take: Act Now!

Increased myopia prevalence over recent decades already poses an unprecedented threat to global eye health through disproportionate increases in high myopia, associated pathology and vision impairment. There is no reprieve in sight with the number of myopes globally projected to nearly double between now and 2050. Further, predicted prevalence in 2050 among Western, Latin American, South Asian and Middle Eastern countries will, in many cases, exceed that currently estimated for East and South-East Asia, despite common thinking that the myopia problem is restricted to the latter populations. Importantly, there is no safe level of myopia with over one third of all cases of myopic macular degeneration observed in low or moderate myopes. In addition to the pathological manifestations, there are important considerations around quality of life and spiraling direct and indirect costs associated with myopia. There is little doubt that increased myopia prevalence is related to lifestyle changes over recent decades. The way to address this major public health issue right now is to treat all pediatric myopes to slow their progression. Simply correcting a young myope's vision is no longer adequate and waiting to treat serves little purpose. Preventative care is at the very essence of modern healthcare practice and prescribing to slow progression is fast becoming the standard of care globally. Act now!

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