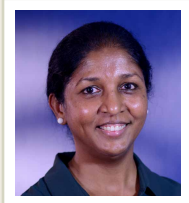


# Contact Lens Update

CLINICAL INSIGHTS BASED IN CURRENT RESEARCH

## Children and contact lenses

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Contact lenses have been long considered an “effective” solution for many vision disorders in children, and the literature on the use of contact lenses in children is largely positive. However, contact lenses are seldom the first choice for vision correction for young patients by either eye care professionals or parents/carers of young children. Although one need look no further than management of conditions such as pediatric aphakia and keratoconus to demonstrate the potential of contact lenses in improving the visual status and quality of life of the young person, overcoming the resistance of carers and practitioners to fitting a young person with a contact lens appears to be challenging.

The perceived barriers to fitting young children with contact lenses centre around the ability of the child to care for the lenses, additional chair time requirements, increased and ongoing involvement of both practitioner and carer in the child’s vision care needs, and the safety of contact lens wear in young children. This editorial summarises the trends and philosophies around fitting children with lenses, especially fitting the emerging modalities such as myopia control lenses, the safety of contact lens wear in children, and the positive impact of contact lenses as a tool for vision correction in the young.

### **Why contact lens wear in young people, and can they manage lens wear?**

In adults, contact lenses are primarily considered for refractive errors such as myopia or astigmatism and are generally chosen as a ‘cosmetic’ alternative to spectacles. Thus, the perception of contact lenses as a ‘cosmetic tool’ may colour the judgement of carers and practitioners when it comes to considering contact lenses for children. However, the impact of contact lens wear on vision-related quality of life of children and teenagers cannot be ignored, with many studies reporting substantial improvements in grading scores related to vision, appearance, peer perception and acceptance in children wearing contact lenses, relative to those in spectacles.<sup>1-6</sup> In addition to increasing cosmesis, contact lenses have many more applications in children and can be used for the management and treatment of a variety of conditions, including amblyopia, nystagmus, pediatric aphakia, anisekonia, bandage contact lenses, retinal dystrophies and more recently for myopia control.

Although carer involvement may be significant when contact lenses are fitted in the very young (such as in the case of pediatric aphakia), children aged 7 to 8 years of age can independently care for and manage contact lenses effectively<sup>7</sup>. In a study involving 85 children aged 11 to 13 years wearing soft contact lenses, nearly all participants expressed confidence in managing lens wear at six months into the study, and a majority reported that they understood the care regimen.<sup>8</sup> Further evidence for the ability of children to be self-reliant with lens wear and care comes from studies reporting on the use of soft contact lenses and orthokeratology for myopia control in children.<sup>9</sup>

In relation to the perception of additional chair time required for fitting contact lenses in children, the data is scant

and not conclusive. An article from Walline et al. reports that the increased time to fit children aged 8 to 11 years versus teenagers aged 13 to 17 years was approximately 15 minutes.<sup>10</sup> The additional time was spent teaching lens insertion and removal. In comparison, a later study reported no difference in the time taken to teach children of various ages (8 to 10 years versus 11 to 13 years versus 14 to 16 years).<sup>7</sup> However, a small percentage of the children (about 5%) required a second training session.

### Fitting trends and myopia control

Although there is a paucity of quantitative data on the type of lens fitted and indications for contact lens fitting for children, it appears that many eye care professionals have fitted children with contact lenses. When surveyed, 97% of practicing optometrists in the American Optometric Association (AOA) reported that they have fitted contact lenses to children younger than 18.<sup>11</sup> Few of them fitted children less than 10 years of age, but many agreed that 10-12 years or later was the appropriate age to introduce contact lenses. For younger children, the optometrists were open to spectacles as the primary method of vision correction and contact lenses as a secondary form of correction, with a shift to contact lenses as the principal form of vision correction occurring at ages 10 years and above.

When asked if their fitting criteria for contact lenses in children had changed compared to a year ago, those who responded in the affirmative indicated that their criteria had changed most for 10-12 year-olds, with 21% of respondents more likely to fit children in this age group versus a year ago. The factors that influenced a decision for change were availability of daily disposable lenses, improved contact lens materials, recent research studies, requests from parents, and children's participation in activities and sports. These practices indicate that although practitioners are generally cautious in their approach to fitting young children with contact lenses, they are not averse to considering lenses for young people and are willing to exercise the benefit-risk approach.

In terms of benefit-risk assessment, there is now substantial and further accumulating evidence for the benefits of prescribing contact lenses to a young person to slow the progression of myopia. It is well documented that multifocal-like contact lenses, extended depth of focus contact lenses and orthokeratology lenses can slow the progression of myopia. It is hypothesised that the lenses slow the progression of myopia either by reducing peripheral retinal defocus, inducing myopic defocus across the retina, or by manipulating the retinal image quality so that it is worse for points behind the retina, to prevent eye growth. When orthokeratology lenses are worn overnight, the lens induces flattening of the central cornea and steepening of the mid-periphery, resulting in an image profile that corrects for the distance refractive error at the fovea of the retina, with relative myopic defocus at the periphery. In a network analysis conducted by Huang et al., orthokeratology lenses and lenses that modify peripheral defocus were proven to slow myopia to a greater extent than spectacle-based strategies.<sup>9</sup>

So when should contact lenses be prescribed for myopia control in children? Here the data clearly indicate a relation between age and progression, with greater progression in younger eyes compared to older eyes.<sup>12</sup> For example, the annual rate of progression is much higher in a seven-year-old child compared to, for example, an 11-year-old child. These data suggest that for myopia control strategies to be effective, early intervention is necessary.

### Complications

Although the case is clear for contact lens wear in children, do the benefits outweigh the risks? Of the complications associated with contact lenses, the event that is of utmost concern is microbial or infectious keratitis, as it is a potential threat to vision. Although rare in its incidence, keratitis is seen at a rate of 20 events per 10,000 eye years during extended wear and at a much reduced rate (2-4 events per 10,000 eye years) for daily wear of soft contact lenses.<sup>13</sup>

Microbial keratitis has been reported in children wearing contact lenses, most commonly with the use of orthokeratology (where there is overnight wear) or soft contact lenses, with some cases reported with the use of colored cosmetic lenses.<sup>14-16</sup> However, given that there is no information on the number of wearers, it is difficult to estimate the incidence of these events. Overnight wear or sleeping in contact lenses and poor hygiene appear to be predisposing risk factors and, during a keratitis event, *Pseudomonas aeruginosa* remains the most frequently identified organism, followed by *Staphylococcus* and *Acanthamoeba* sp. Although the seriousness of an adverse microbial event and the importance of medical intervention cannot be overstated, recent studies report that contact lens associated microbial keratitis without other risk factors such as trauma has a good prognosis with respect to eventual visual outcome<sup>17, 18</sup>.

A systematic review of literature reporting safety outcomes with contact lenses in children found that there appears to be no increased risk of developing corneal infiltrative events in children compared to adults, and indeed the risk might possibly even be lower in children aged 8 to 11 years old.<sup>19</sup>

Collectively, these data indicate that although there is an existent risk of developing complications during lens wear in children, this risk is no higher than that observed in adult wearers. Ensuring vigilance, hygiene and education around safe lens wear will ensure that the risk is minimal.

### Summary

The benefits of contact lens wear in children go beyond simple refractive error correction. In spite of the encouraging data on improved quality of life with contact lenses in children, presently, use of lenses in children is often restricted to certain areas, such as management of complex conditions and as an accessory device for certain situations, such as in sport. However, the accumulating body of evidence around cosmesis, safety and efficacy of contact lens use in children suggests this modality should be considered as a mainstream management option, especially given the evidenced role of contact lenses in slowing myopia. However, considering the possibility of developing potentially serious complications such as microbial keratitis, adopting strategies to minimise risk is essential. For either daily wear or daily disposable wear schedules, patient education with regular monitoring and oversight should help promote successful contact lens wear.

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