

Fitting children with contact lenses

Part 1

In the first of two articles, **Anna Sulley** takes a look at why we might fit a child with contact lenses and what should be considered to ensure success. **Module C10884, one contact lens point suitable for optometrists and CLOs**

Fitting children with contact lenses (CLs) provides a tremendous opportunity to develop a practice, in addition to giving a sense of satisfaction by making a difference to younger patients' lives. However, there can be reticence from parents, patients and some practitioners in offering lenses to children as an option for vision correction. The first article will review whether children should be routinely fitted with CLs and the impact it has on them. The children referred to here are from around eight years to their early teens; younger children and babies are not considered here.

Children under 16 represent around one in five of the total UK population, which is similar to those of retirement age.¹ Children are an important age group for the future growth of CLs. Interest in lenses starts at an early age and their use is widely suited to this age



Figure 1 Some self-perceptions improve with contact lens wear

group, bearing in mind their lifestyle. However, only a small proportion of practitioners fit under 10-year-olds with CLs, and only a third consider fitting 10-12 year-olds; the average age practitioners start to prescribe at is 13 years.

Why fit children with lenses?

As with any patient, fitting CLs offers the convenience of spectacle-free wear in addition to the primary benefit of visual performance improvements. They provide consistent, natural vision with minimal peripheral distortion, increased field of view and remove the burden of spectacles. Lenses can improve vision for sport and leisure activities, where children often remove spectacles for fear of breaking them, and so also provide an additional element of safety.

There are a large number of clinical and visual indications to fit children with CLs. These are refractive, patho-

CLIP study to compare chair time and review benefits of lens wear for children and teenagers

Reco-workers have concluded that practitioners should routinely offer lenses for young children as for teens.³ The CLIP study was a three-month, bilateral, daily wearing study at three sites in the US. Neophytes (84 eight-12 year-olds, 85 13-17 year-olds) were fitted with a spherical or toric silicone hydrogel (Acuvue Advance or Acuvue Advance for Astigmatism). Lens fitting and follow-up times were compared between children and teens, including time needed for insertion and removal training.³ Parent and patient questionnaires were completed pre- and post-wear and details taken of ocular physiology. Follow-up appointments were after one week, one month and three months for visual acuity, lens assessment and biomicroscopy. The benefits of CL wear were also reviewed using a Paediatric Refractive Error Profile (PREP) survey to compare quality of life between those wearing CLs and spectacles.⁴ The items included vision, symptoms, appearance, satisfaction, activities,

academics, handling and peer perceptions and were scored on a scale from 0 (poor) to 100 (excellent). An overall PREP score was assigned as an average of the results from 26 statements.

There were significant differences in mean total chair time ($P=0.003$); it took around 15 minutes longer for children compared to teens (110 compared to 95 minutes). However, there were no differences between time for fitting; the difference was with insertion and removal training ($P=0.01$, 42 for children and 30 minutes for teens). Once trained, the children were equally adept and average wearing time (80 hours per week for children, 84 for teens) and comfort were similar to that of the teens. Any additional training needed can easily be supervised by support staff, making the time practitioners spend with the groups to be similar. All subjects had an excellent understanding of lens care and none experienced any problems during the study. The only change in biomicroscopy signs was in conjunctival staining;

this increased from 7 per cent (baseline) to 20 per cent (three months, $P=0.0006$) and was similar for both groups.

Both children and teens benefited from significant improvements in their quality of life with CL wear, seen in how both felt about their appearance and participation in activities. CL wear significantly improved the overall PREP score for both children and teens ($P<0.0001$); this was stable during the study with no differences between groups. After three months, the PREP score increased from 64 for children and 62 for teens with glasses at baseline to 79 for children and 77 for teens. Areas of improvement were in satisfaction with their correction, during activities and in their appearance. Six out of 10 felt their sporting performance was better with lenses. Seven out of 10 children and eight out of 10 teens preferred wearing CLs to spectacles (little or a lot better) and had a high satisfaction rate with lenses (97 per cent children and 99 per cent teens).



logical and to improve binocularity (Table 1). There is also the potential for being free from CL wear during the day, and possibly myopia control, with orthokeratology, in addition to the protection from UV-radiation offered by some lenses.

An additional key benefit of CL wear for this age group is its effect on appearance, improving interactions with peers and building self-confidence, and helping teach responsibility. Quality of life benefits afforded by CLs for the young are often overlooked; in addition to improving confidence,² fitting children can lead to psychological and emotional benefits.

There is a considerable personal reward gained from fitting children with lenses; seeing them smile and grow in confidence having discovered the benefits of CLs and mastered their handling gives a huge sense of achievement to practitioners. Children are enthusiastic, quick to learn, relatively easy to fit and represent a large untapped population of CL wearers. The cost of lenses is unlikely to be considered an issue compared with new spectacles and monthly payment options can make finances manageable. They are a useful way to help build a practice; this can

TABLE 1

Indications for contact lens wear in children

- Refractive - myopia, hypermetropia, astigmatism - in particular once worn full time
- Pathological - albinism, aniridia (cosmesis, photophobia)
- Orthoptic - anisometropia (reduce or eliminate amblyopia), strabismus, binocular vision anomalies (accommodative esotropia, convergence excess)
- Sport and leisure activities
- Children who regularly break spectacles
- Concerns about appearance in spectacles
- Frequent refraction changes; updating disposable CL powers inexpensive compared to changing spectacles

continue for many years as children and their families are likely to be patients for life with improvements made to their appearance, visual performance, confidence and quality of life.

Are children compliant?

There are many barriers presented by parents when considering fitting children; one is their child's potential level of compliance with lens wear and

care. This is from the parents' perception of their child's behaviour, and could also be due to the link highlighted in the lay press between potentially sight threatening complications and non-compliant behaviour.⁵ These stories present how lessons are not being learnt with compliance and bemoan the potential downsides with CLs.

Good compliance is essential to maintain successful CL wear and minimise the risk of ocular complications, some of which can be serious.^{6,7} It is quite probable that children will be non-compliant in one way or other, whether deliberate or unintentional, as are other CL wearers. The proportion of non-compliant CL wearers is reported to range from 40 to 91 per cent⁸ and patients are often confused or ignorant about their behaviour. It has been demonstrated that 16-50 per cent of patients do not wash their hands prior to lens handling. Compliance is the responsibility of all involved: in this case, patient, parent and practitioner. However, studies have shown that compliance is no worse in young children than other wearers and they are quite capable of handling lenses and managing their wear and care.^{3,9} A survey of 11-13 year-olds wearing

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soft CLs over six months found a high level of compliance and ability to follow instructions. Ninety per cent knew daily cleaning was necessary, 96 per cent understood about lens disinfection and 99 per cent were able to express confidence in caring for their CLs.

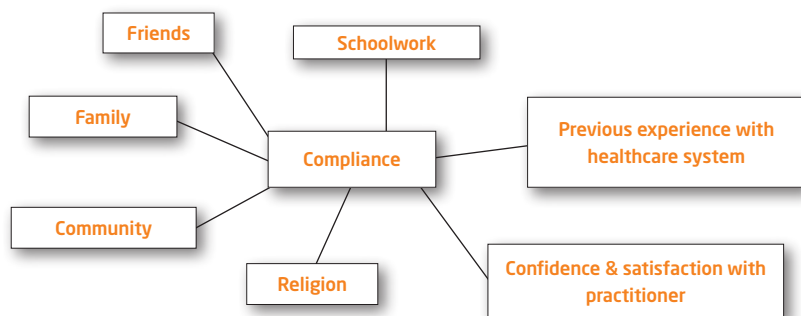
Compliance is thought to be influenced by a patient's beliefs. The Human Belief Model, introduced by Becker and Maiman, was developed to reveal reasons behind non-compliance in general healthcare.¹⁰ The model shows far more opportunities not to comply with a procedure than follow it, especially if a patient believes the consequences of non-compliance are unlikely to happen. It describes that people will be compliant if they follow certain beliefs, including being interested in health and motivated to follow health recommendations. Sokol¹¹ found undesirable beliefs from all the HBM dimensions could be found among non-compliant lens wearers. To improve compliance, patients need to acquire knowledge and self-management abilities, and want to apply them throughout the time they wear their CLs. Children are quite impressionable at a young age, and so best practice for good habits about compliance could be learned and established by wearing lenses from an early age. External factors are also known to affect patient compliance (Figure 2).¹²

The important steps in lens wear, care and hygiene should be reiterated at all aftercare visits to improve compliance, in addition to careful explanation during the initial fitting. Reasons should be given why cleaning and disinfection are important for comfortable, trouble-free CL wear. By keeping the care regimen and wearing routine simple yet effective, compliance rates can be increased. Verbal and written instructions should be provided in addition to demonstrating the cleaning, disinfection and case care routine. There is a range of strategies that can be taken to improve compliance (Table 2).

What about the risks of fitting children with lenses?

Although there are benefits in fitting children with CLs, there could also be the possibility of trouble in the unlikely event of a significant issue with lens wear. This could be why practitioners are at times reluctant to fit younger patients. It is essential that children do not abuse the wear of CLs since, although very rare, microbial keratitis could be devastating. Practitioners should rely on feedback from parents who can more easily evaluate the child's level of responsibility and who will

Figure 2
External factors affecting patient compliance



ultimately have the final say. Lenses are a medical device and, as such, require a level of respect from the wearer. There is no evidence of differences in the levels of contact lens safety in children compared to adults and no increased risk of microbial keratitis.

How can children be motivated to wear CLs?

There will be a level of anxiety on all sides when fitting young children with CLs. This should be turned into enthusiasm – children are always eager to learn new things – and the rewards can be significant for all. Children need to be motivated, and this must be apparent before fitting them. The need to wear lenses must come from the patient and not just their parents. They need to be keen to proceed with the fitting, want to touch their eyes and understand the need to care for their lenses for healthy, successful lens wear. It may well be parents who first suggest CLs for their child; the child may not have considered the functional benefits but are likely to be nervous about the prospect of wearing lenses and, in particular, putting lenses in. They may imagine the lenses will hurt, sting or worse. Once it has been

TABLE 2

Strategies to improve compliance in children wearing contact lenses

- Earn patient and parent's trust and confidence - involve them in identifying management plan
- Consider factors that may influence compliance (Health beliefs)
- Explain reasons for appropriate lens care and hygiene - establish a perceived need (comfortable, trouble-free lens wear) yet be cautious about creating concern
- Describe positive outcomes from good compliance and give positive reinforcement
- Simple, yet effective, routine and care regimen to avoid confusion - use daily disposables, multipurpose care solutions
- Education - clear, specific and concise - repeat key points to enhance memory
- Give patient and parent opportunity to ask questions
- Remind patients to always wash their hands prior to handling lenses; they should see practitioners doing the same in the consulting room
- Demonstrate cleaning routine and case care
- Give written instructions and patient literature to take home
- Go over lens care during aftercare visits using open questions such as 'Show me how you clean your contact lenses'

ACHIEVE study on self-worth and vision-related quality of life benefits with CL wear in children

The Adolescent and Child Health Initiative to Encourage Vision Empowerment (ACHIEVE) study was a randomised, single-masked trial at five sites in the US.² Myopes aged eight to 11 wore spectacles (n = 237) or soft CLs (n = 247) for three years, being assessed at baseline, after one month and then every six months.

The self-perception profile for children's global self-worth used in the study found that CL wear did not affect global self-perceptions. However, physical appearance, athletic competence and social acceptance self-perceptions were all improved with CL wear, highlighting the social and visual benefits of lens wear when selecting the most appropriate vision

correction modality for children.

The PREP survey used in the study compared the vision-specific quality of life between children affected only with refractive error. There was the greatest improvement in CL wearers for satisfaction, appearance and participation in activities, with small changes noticed as early as one month. Vision-related quality of life benefits improved more for children who wore lenses compared to those wearing spectacles over three years.

Children who require vision correction should be given the option of CLs since their wear improves how they feel about their physical appearance and participating in various activities.



agreed that CLs are to be pursued as a vision correction option, lenses should be inserted to show the child they are comfortable; the benefits will then become obvious. Encouragement is needed for the children throughout the fitting process as although they may be motivated, they may not always be enthusiastic, in particular during teaching lens handling.

When should children be fitted with contact lenses?

Determining a patient's suitability to wear lenses from a clinical perspective is a relatively easy task compared to deciding whether a child is ready to wear lenses. There are a range of attitudinal and behavioural markers to be considered, including the patient's ability to demonstrate their maturity, motivation, approach to compliance and ability to handle lenses, in addition to the need for parental consent.

The average age children are fitted initially is around 13 years, although research has shown that reducing this to eight to nine years has no negative effects on success. Lens fitting may be left until patients are older if practitioners are less comfortable in discussing lenses with such a young audience. There is no specific age at which lenses can be considered; this will be on an individual basis depending on a number of factors including maturity and patient needs (visual and quality of life). Some seven-year-olds may be ideal, whereas some twice this age may not. Parents are often unsure at what age children can start wearing lenses and will often wait for practitioner recommendation. They also often mistakenly believe, in particular if they are not a lens wearer themselves, that CLs are hard to adapt to, may be uncomfortable and hard to care for, in addition to concerns about the cost. These myths can be easily dispelled by discussing lenses as an option for their children and this proactivity will be welcomed by parent and patient. The initial discussion about CLs should therefore begin at an early stage. Lenses can be mentioned as a refractive error correction option when a child first needs spectacles, even if initially for part-time wear. This plants the seed at an early stage, and as time progresses both child and parent will begin to consider the benefits that lenses could offer. Interest in CL wear tends to be around three years from when patients start wearing spectacles; this may well coincide with when the prescription has reached a level at which spectacles need to be worn full-time. It is likely that interest by girls will begin at a

TABLE 3
Myths in fitting contact lenses to children

MYTH	REALITY
Clinical	
Need stable Rx and constant monitoring	Seen regularly for CL checks when Rx can be updated, in particular with disposable lenses
Eyes too small for CLs and still growing; need different parameters	Eye adult size within few years; standard parameters appropriate. Infant HVID 10mm and 11.7mm by 2 years (adult size); Infant corneal radius 7.1mm that flattens to 7.86mm (adult) within few years
CLs should not be worn while eyes growing	Incorrect
Health	
More at risk of microbial keratitis than adults; delay wear as long as possible	No evidence to suggest this; risk MK low especially with DW, DDs and RGPs; main risk factors include EW and poor compliance
Eyes need more oxygen than adults	Corneal physiology little different to adult except more endothelial cells; hydrogels acceptable for many; may need SIHs or high Dk/t RGPs for long wearing times and/or high Rx
Pre-existing blepharitis & poor lid hygiene in adolescents	Manage lid hygiene issues prior to fitting
Only finite number of years can wear CLs; start later in life	No need to start CL wear later; high Dk/t CLs for sufficient oxygen provision
Vision will deteriorate more if Rx worn full time	Vision will not deteriorate more; CLs can help vision in some orthoptic cases
CL wear will lead to complications in children	No difference in ocular health between children and teens in CLIP study
Compliance	
Poor hygiene; children don't wash hands	Children as compliant as teens; reiterate importance at all appointments
Not responsible enough to care for CLs	Children adept with CL care; age is not a barrier
Behavioural	
Not interested in CLs until certain age and won't benefit; only parents want CLs for children	Nearly three-quarters of children (8-11) prefer CLs to spectacles; improvements in quality of life for children and teens for activities, satisfaction and appearance
Fear of lenses hurting, not being able to touch eyes or remove CLs, lenses falling out or getting lost behind eyes	Insert CLs to show comfortable; careful teaching of I&R; fit with part time and/or daily disposables first; soft lenses should not fall out
Parents consider child too immature and CLs unsuitable for children	With assistance from parent and practitioner, children are adept and compliant patients
Fitting	
Hard to fit children	CLIP study shows little difference total fitting time between child and teens; 10 minutes longer I&R training (can be done by support staff)
Handling, I and R problems	Select CL with good handling properties
Must fit daily disposables as won't clean CLs	Daily disposables are an ideal option; but children also compliant with care regimens for reusables
Additional chair time	Little difference between children and teens
Need RGPs which can't be fitted until 12 years	Children can wear soft or RGP CLs at any age
Financial	
CLs are too expensive for children	CLs need not be a costly option; significant quality of life in addition to vision correction benefit
Children are not loyal patients	Direct and indirect financial impact on practice



younger age than with boys; girls tend to be concerned with their appearance at an earlier age (12.8 years compared to 13.5 years).

What are the objections to children wearing lenses?

As with all CL wear, there are a wide range of potential barriers about children wearing lenses from patients, their parents and also practitioners. These objections are summarised in Table 3 along with details that dispel the myths. The barriers of poor compliance have been addressed, along with the potential increase in risks fitting children. One of the main barriers to children being fitted with CLs is their parents; many will not be convinced that lenses are an appropriate option for their children, and this is mainly due to health and compliance concerns. This is where the practitioner's role is important as a mediator between the child and parent, in particular if the parent is not keen when the patient is.

Conclusions

Parents often report that practitioners do not offer children contact lenses as an option for refractive error correction, despite their impact on a child's development and confidence, in addition to the visual benefits. Recent research has shown how young children benefit as much as teenagers from lens wear, with no additional chair time needed for their fitting. Lens wear in the young does not lead to a higher risk of adverse events and children are mature enough to manage lenses. Although challenging at times, fitting children can be rewarding in addition to generating patients for life and being an excellent source of referrals.

The second article will discuss strategies to fit children with lenses and how to determine the most appropriate modality and lens type. It will also review myopia progression and the potential benefits of orthokeratology for this age group. ●

TABLE 4
Acronyms for recent paediatric contact lens studies

Acronym	Study	Description
ACHIEVE	Adolescent & Child Health Initiative to Encourage Vision Empowerment	Effects of CL wear on children's self-perceptions
CLIP	Contact Lenses In Pediatrics	Benefits of fitting CLs to children & teens
CLAMP	Contact Lens & Myopia Progression	Myopia control with gas permeable CLs
COOKI	Children's Overnight Orthokeratology Investigation	Efficacy overnight corneal reshaping CLs for children
CRAYON	Corneal Reshaping & Yearly Observation of Nearsightedness	Myopia control with corneal reshaping CLs

MULTIPLE-CHOICE QUESTIONS - take part at opticianonline.net

1 What is the average age for children being first fitted with contact lenses?

- A 8
- B 10
- C 13
- D 16

2 According to the CLIP study, what is the main reason for increased total chair time when fitting children?

- A More thorough slit-lamp assessment
- B Longer time in teaching I and R
- C Longer history and symptoms taking
- D Time for initial fitting

3 Which of the following slit lamp signs showed significant change when a lens was worn regularly by a child?

- A Corneal clarity
- B Limbal redness
- C Microcyst response
- D Conjunctival staining

4 Which of the following statements is true?

- A There is no evidence of increased risk of MK in children
- B Children's eyes need more oxygen than adult eyes
- C Full time correction speeds up progression of refractive error
- D The infant eye is too small for contact lenses to fit

5 What is the average infant horizontal visible iris diameter?

- A 6mm
- B 8mm
- C 10mm
- D 12mm

6 What is the average infant corneal radius?

- A 6.9mm
- B 7.1mm
- C 7.4mm
- D 7.86mm

Successful participation in this module counts as one credit towards the GOC CET scheme administered by Vantage and one towards the Association of Optometrists Ireland's scheme.

The deadline for responses is April 2 2009



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