Key considerations when dispensing children’s spectacles

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The dispensing of spectacles to children (ie, those below 16 years old) presents certain challenges that are not witnessed in adults. Dispensing opticians (DOs) and optometrists therefore need to take a different approach when dealing with such patients. The following article will discuss how to tackle the issues that may arise. Two different paediatric dispensing scenarios will then be looked at in detail.

The Opticians Act (1989) dictates that spectacles can only be dispensed to patients below the age of 16 by, or under the supervision of, fully qualified dispensing opticians and optometrists. However, even proficient practitioners such as these may lack experience when it comes to addressing the needs of younger patients. Spectacles are not always prescribed to children purely to correct a refractive error - they may also be used to rectify binocular vision anomalies (eg, strabismus, amblyopia, convergence problems, etc). Strabismus is defined as being when the visual axes are misaligned and both eyes do not point directly at the object of regard causing what is commonly called a squint. Patching the good eye is often used in conjunction with the corrected refractive error in the form of spectacles when treating a strabismus. Amblyopia can be defined as a visual loss resulting from a disturbance to the normal development of vision. It is commonly called lazy eye and exists when problems in visual development occur due to strabismus or anisometropia which, later on, is unable to be corrected using spectacles. Amblyopia can develop up to about the age of approximately 7 years of age (critical period). Convergence problems include convergence insufficiency where near visual tasks become difficult but which can be solved by wearing spectacles.

Competencies covered:
Dispensing opticians: Communication, Optical appliances, Paediatric dispensing
Optometrists: Communication, Optical appliances

This article has been approved for 1 CET point by the GOC. It is open to all FBDO members, including associate member optometrists. The multiple-choice questions (MCQs) for this month’s CET are available on page 10 and online. Insert your answers to the six MCQs on the inserted sheet or online at www.abdo.org.uk. After log-in, go to ‘CET Online’. Please ensure that your email address and GOC number are up-to-date. The pass mark is 60 per cent. The answers will appear in the May 2014 issue of Dispensing Optics. The closing date is 18 April 2014.
There is a distinct difference between children’s facial features and those of an adult. Furthermore, their features are still in a state of development. When dispensing to a child, their mental age and what stage they have reached in their visual development needs to also be taken into consideration.

Communication with patients
The effectiveness of a DO’s interpersonal skills can be put to the test. The DO not only has to interact with the patient, but also the accompanying parent(s)/guardian(s) - referred to as the ‘duality of the patient’1. As a child may not be able to express themselves too well, often it will be difficult for them to let the DO know if their vision has been impacted upon because an error has been made and so it is imperative to get the dispense correct initially. Frame fitting mistakes can result in discomfort or even lead to facial disfigurement in some cases2. The DO should always use simple, familiar terminology when speaking to the patient, keeping as much as possible to short, concise sentences. Thought must be put into what order words are placed when conversing with very young patients to allow them to understand the discussion as their attention span may not be great. The DO should engage directly with the patient while also including the parent/guardian. The dialogue should be kept light-hearted, as this will mean that the patient then starts to associate the practice with having fun and thus future visits won’t be problematic.

Procedural advice
Dispensing activities can, if the child prefers, be undertaken in the practice’s play area, as this will help to put the patient at their ease and the dispense is less likely to prove traumatic (Figure 1). The DO should be at eye level when speaking to or taking measurements from the child to make the process more pleasurable for them. It is also suggested that the DO employs a pen torch or brightly coloured pen in order to aid fixation while pupillary distance (PD) measurements are carried out. Using some form of toy (or a mirror) can prove highly effective when trying to keep the patient occupied. It can also prove beneficial for the parent/guardian to stand behind the DO while PD measurements are being taken, so that the patient looks in the correct direction. In addition, getting the patient involved in the task can also be worthwhile - the DO could give a PD rule to the patient to play with and try to encourage them to take somebody else’s PD measurement.

Frame selection
The dispensing of spectacle frames to children can be a complex and potentially challenging process, as there are a wide range of different dynamics that influence it. Firstly, it is vital that the child’s on-going physical development is acknowledged by the DO and children’s frames are not designed to be scaled down adult frames, as the child’s specific measurements must be accounted for. When compared to the spectacle frames of an adult, those worn by a child will tend to require a reduced crest height, a larger frontal angle, a smaller frontal width, a shorter bridge projection, a widened splay angle, a decreased angle of side and a smaller boxed lens size. They are also likely to require a reduced length to bend, a decreased length of drop and a shorter back vertex distance (BVD). A pantoscopic angle of zero is optimal for a child3. Children with facial features that are atypical, for example those with facial disfiguration, may require the dispensing of frames that have been adapted, or possibly frames that are specially made.

Plastic frames can be suitable for children as long as the bridge of the frame is the same shape and width of the patient’s bridge. Regular, fixed pad or keyhole bridges are all useful only if the fit is correct. As the major bearing surface, the bridge of the frame should facilitate a comfortable and supportive fit which will maintain the position of the lenses in front of the eyes. Metal frames have the advantage that they can be easily altered (adjustable pads on arms, adjustable comfort bridges or strap bridges) to correspond with particular facial dimensions. Titanium frames can be utilised if the patient is allergic to nickel.

When a frame is being selected, the patient’s PD and the boxed centre distance should be practically equal. If so, no decentration will be required when glazing. Correct centration can radically influence lens thickness and weight, resulting in the most favourable cosmesis, especially in lenses of higher powers. For
hypermetropic patients, as small a lens uncut size as possible should be dispensed, so that lens thickness and weight are both kept to a minimum. Plastic frames should be considered to help in concealing any edge thickness. Frames with wide sides are most suitable for high myopes - covering up the edge thickness, as well as bolstering durability. Such frames should only be dispensed to older teenagers as a wider side has the disadvantage of restricting the peripheral field.

**Lens options**

As DOs we have a range of suitable lenses to choose from when dispensing to children. Lenses being dispensed to children need to be lightweight and relatively thin, so that comfort levels are maximised. They should also exhibit a high degree of robustness. Glass lenses which have not been toughened could potentially shatter if subjected to rough treatment and must never be dispensed to children. Lenses that are highly durable, with scratch resistant and high impact resistant properties will be the best option. Ensuring that the patient is adequately safeguarded from the effects of ultraviolet (UV) radiation is essential too, as this is particularly dangerous to eyes and skin that are still immature and don’t have the fully developed protection mechanisms of adults. The larger pupils and clearer ocular media of children’s eyes make them particularly vulnerable to UV and the World Health Organisation approximates that up to 80% of a person’s lifetime exposure to UV radiation is reached before the age of 18. This is partially due to the extended times children spend outside playing.

Applicable lens materials include CR39 (refractive index, n = 1.498; Abbe number = 58) which naturally has good impact resistance and surface durability, as well as UV protection to 355nm. Polycarbonate, in comparison, will be thinner and lighter (as n = 1.586). It is also 100% resistant to UV up to 380nm. The material offers high impact resistance, but is relatively soft and therefore prone to scratching. It also has an Abbe number of only 30 and so induces chromatic aberration (seen by some patients as colour fringing). Trivex (n = 1.532) on the other hand has a far higher Abbe number of 45 and has good resistance to scratching and cracking. Like polycarbonate it has high impact resistance and also 100% UV resistance to 380nm. Should high index plastics be required (n = 1.6-1.74), the lenses are innately thinner and shatter resistant, however, the Abbe number will be between 32 and 41, potentially leading to colour fringing (something which children when they reach their teenaged years are sometimes aware of). These also offer highly effective UV protection.

Scratch resistant coatings are profitable to children as one of the primary reasons their spectacles require replacement so regularly is due to scratching of the lenses. Anti-reflection (HMAR) coatings offer the same advantages to children as they do adults however, the additional cost incurred should be outlined to the parents/guardians. HMAR coatings can be especially beneficial for children who use computers, televisions and videogames to such a high degree. Such lenses also have the benefits of looking better cosmetically which is important to self-conscious teenagers. HMAR coated lenses are more scratch resistant than uncoated lenses, but softer than lenses that solely have a hardcoat, depending on the manufacturer.

**Scenario 1**

Here the patient is a teenager, aged 13, who requires the following prescription:

- R: -8.00/-2.00 x 5
- L: -6.75/-1.75 x 170
- V/A: 6/6
- BVD: 12mm

Patients in their teens tend to be extremely image conscious and by this point will have started to formulate their own opinions. The influence of popular culture on the patient should be factored in, as they are more likely to wear spectacles that echo this. Such frames may be decorated with attractive logos, made by the patient’s favourite designer, or similar to those worn by a celebrity that they idolise. If the upshot of this is that the patient wears the prescribed spectacles instead of refusing to, then an improvement in their vision will result. Some children are unhappy at the thought of having to wear spectacles and sometimes believe they will no longer be accepted by their peers, so anything to help negate these ideas is good. Furthermore, if the patient is given a trendy case to keep the spectacles in on their collection, they are more likely to take them out and wear them in school or elsewhere.

Metal and plastic frames selected for such a patient outlined in Scenario 1 will usually have drop-end sides and it is vital that the side is adjusted so that the bend sits at the ear point and the drop should rest along the side of the head. One common error is that the bend sits too far behind the ear and so the spectacles will drop down the child’s nose. For these reasons, the temple width and length to bend should be measured and recorded, and the spectacles adjusted accordingly. The DO needs to make certain that there is no undue drop behind the ear and particular attention to this when dispensing a frame with a plastic side as these cannot routinely be cut down. DOs need to always ensure that the frame, where appropriate, has sprung joints for increased robustness.

During the dispensing process appropriate measurements to be taken for the example given are firstly monocular PD. At this age, the child should be able to fixate properly and so the monocular PD ought to be taken using a PD rule or pupillometer. Should the patient be unable to fixate accurately (and also for all those with lower prescriptions), the binocular PD could be taken. If the patient struggles at fixating, a pen torch can be utilised in order to establish the position of the corneal reflexes of distance-fixated eyes. The distance between the nasal and temporal corneal-scleral margins, or the distance between the nasal and temporal pupil edges, should then be measured to obtain the binocular PD.
Where a relatively high level of facial asymmetry is present and for those with higher prescriptions, such as the patient in this scenario, monocular PD needs to be measured in order to prevent unwanted prismatic effects being introduced when glazing. If centration is not properly accomplished, the two optical centres will not coincide with the pupil centres in one or both spectacle lenses, resulting in unnecessary prism. This induced prism is defined as the prismatic effect created when the patient’s visual axis does not pass through the optical centre of an ophthalmic lens.

When dispensing higher prescriptions (considering distance spectacles only) and/or if opting for high index or aspherical lenses, the vertical centration (or heights) of the patient’s pupils in the frame should also be measured. This measurement needs to be lowered by 1mm for every 2° of pantoscopic angle of tilt of the frame (should the pantoscopic tilt not be zero, which is preferable). BVD is necessary for all prescriptions over ±5.00D according to British Standards (BS 2738).

It should be ensured that the parent/guardian is made fully aware of the patient’s NHS entitlements. All children aged under 16, who have had an NHS eye examination, are permitted a contribution towards their spectacles from the NHS providing there has been a change in their prescription or if their spectacles need to be replaced due to fair wear and tear. Children are liable to break or lose their spectacles and so are entitled to repair and replacement NHS vouchers.

**Scenario 2**

Here the patient is a baby aged 12 months and has a strabismus. This requires the prescription described below:

**R:** +4.75/-1.00 x 90  
**V/A:** 6/12

**L:** +4.00/-0.75 x 175  
**V/A:** 6/12

At this age, VAs are established using preferential looking cards (eg, Cardiff Acuity Test Cards or Keeler Acuity Cards) where the optometrist purely notes the child’s eye movements on deciding whether or not the child has seen the relevant picture on the card shown.

Babies and other patients who need indestructible frames will require those which are generally made of soft, silicone-based rubber. This is a light and malleable material and frames made from this will not have metal joints and pad arms thereby reducing the likelihood of potential facial injury. Such frames would require loop-ends to which a headband can be attached to keep the spectacles in place.

Alternatively, a frame with curl sides could be considered, so long as they are adjusted perfectly. A frame where the sides do not dig into the patient’s head and where each pupil is fully aligned with the centre of the respective lens should be selected.

This will avoid the necessity for decenteration and will help to ensure that the smallest blank size selection is made. This will guarantee that the lenses’ weight plus their centre and edge thicknesses are kept to a minimum, which is vital for hypermetropes.

For the child in Scenario 2, whichever frame is selected, it is critical that its bridge fits correctly, to enable the full weight of the spectacles to be supported between the crest and the ear points (see Figure 2). A frame with an attached comfort bridge, or one where a strap bridge can be attached, is most suitable in this scenario. It is important to be aware that patients of this age will have lower crest heights than older children. An ill-fitting bridge could be potentially painful for the patient, who (as already mentioned) would be unable to communicate this effectively to their parents/guardians at this age. In addition, this can lead to a permanent ridge developing through the deterioration of the patient’s adipose tissue as they get older. The spectacles’ weight should be evenly distributed over as great a surface area as possible. If a frame with nose pads is dispensed, the size of these pads should be as large as possible within the confines of the frame’s parameters, and oval or teardrop shaped, rather than circular.

The frame measurements appropriate to curl sides are:

- Length to tangent - this is the...
measurement from the dowel point to the tangent ie, the apex of the curl
• Total length of side - this is the measurement from the dowel point to the tip of the side, which is best taken when side is straightened (see Figure 3).

Each side should be modified so that the end of the side when curled does not touch the child’s lobe and the side ought to stop just short of the patient’s lobe. A curl side which fits well should nestle in the groove behind the ear. Should this not occur the earlobe will be at risk of developing in a deformed manner. In order to aid robustness and patient comfort, the ends of the curl of the sides must be enclosed in silicone (see Figure 4).

If required, curl sides can also be fitted to frames with drop-end sides. It is possible that curl sides can make the patient more averse to wearing spectacles and so, as soon as the patient is capable of looking after their spectacles and is comfortable in them, a frame with drop-end sides should be dispensed. Frames with drop ends also will make the patient feel more grown-up.

PD can be measured as in Scenario 1, however as the child in this case is very young they are unlikely to be able to fixate. As the child in Scenario 2 has a strabismus, each eye needs to be occluded in turn and the PD measurement taken monocularly. Now, the PD measurement is taken from the centre of the child’s bridge out to the pupillary reflex in each eye. The preferable way to obtain this measurement (for the right eye) is for the DO to occlude the child’s left eye and hold a pentorch directly under their own left eye. The right monocular PD can then be measured from the child. The process is repeated in reverse for the child’s left eye. A colourful object on top of the pentorch will help the child to fixate properly. Should the binocular PD be required for a child, the distance measurement can be taken between the temporal edge of the limbus of one eye to the nasal edge of the limbus of the other eye or alternatively between the nasal canthus of one eye to the temporal canthus of the other eye. This is always an excellent tool in dealing with young children so as to obtain their binocular PD, with the additional benefit of being quick to perform.

For such a young patient, the frame is likely to be 55mm or less in terms of the frame PD (eye size + distance between lenses) and require some form of adaption. The patient will consequently be entitled to receive a small frame supplement (in addition to their GOS3 entitlement as determined by their prescription), under the NHS optical voucher scheme, providing both of these criteria are satisfied. This will give the parents/guardians substantial financial help towards the spectacles.

When dispensing to very small children, it is vital to remember that any anxieties of the parent/guardian need to be dealt with. They can get quite upset about the fact that their child/ward for which they are responsible requires spectacles at such a young age. For this reason, your empathy should be displayed and a box of tissues is always good to have at hand. It is very important that the parents/guardians are kept completely informed about all aspects of their child/ward’s dispense. Try to reassure the parents/guardians that the patient will take time to adapt to their new spectacles. There is a strong probability that regular adjustments to the frame will be required as the child grows. It is also prudent to advise that the fit of the frame on the patient should be checked frequently (ideally every 3 months). It is important to explain how to care for the spectacles ie, try to teach the infant as they grow to put their spectacles down without scratching the lenses and to take their spectacles on and off with both hands. Advise them to choose a pastime the patient is fond of and one where the spectacles offer some aid, such as looking at a book or colouring-in, and the child will eventually learn to correlate wearing spectacles with an enjoyable activity and they will ultimately realise their vision is clearer when wearing their spectacles. Parents/guardians who themselves wear spectacles should be advised to wear them in front of their child, as this will help persuade them to wear their spectacles too. It is often a good idea, for those patients who have a favoured soft toy or doll, to give them a spare frame for their toy to wear which in turn should encourage the child to wear their own spectacles. It is imperative that the parent/guardian is conscious of the fact that you, the DO, are accessible if they have any additional questions to ask.

Conclusion
It is essential that children are dispensed with correctly fitting spectacles by treating them as individuals and not like miniature adults. Their parent/guardian also must obviously have a role during the dispense, as they must have everything explained to them as it proceeds. Frame and lens selection is critical for which advice is given. It is also vital that accurate measurements are taken for which, hopefully, this article has provided a number of hints and tips.

References

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MCQs Continued overleaf
Multiple choice questions (MCQs):
Key considerations when dispensing children’s spectacles

1. The term duality of the patient means
a. involving the parents/guardians at every stage
b. making sure the patient understands what is happening
c. being assertive and ignoring technical queries
d. concentrating solely on the patient

2. Which statement regarding spectacle lenses is false?
   a. Nasal edge thickness will increase if a positive lens is
decentred inwards
b. Polycarbonate material is more prone to surface abrasion than CR39
c. The lower the Abbe number the more colour fringing may be noticed
d. All plastics lenses provide UV radiation protection up to 380nm

3. A pantoscopic angle of zero is preferred for a young child because . . .
   a. the optical centres of the lenses should be central in the frame
b. the lower edge of the rim must be clear of the cheeks
c. the angle of side should be zero
d. this prevents them looking over the top rim

4. Frames with plastic sides are not ideal for very young patients because . . .
   a. it is not usually possible to shorten them effectively
b. the thickness presses against the temple
c. the length of the drop cannot be altered
d. they are not hypoallergenic

5. In young children, what would not be treated by wearing spectacles?
   a. amblyopia
b. accommodative esotropia
c. anisometropia
d. anisocoria

6. The boxed centre distance of the frame and the binocular distance PD should be equal because . . .
   a. there should be equal decentration in each eye
b. vertical centres should be on the horizontal centre line
c. temporal and nasal edge thickness will then be the same in each eye
d. pressure along the temples should be avoided

Extension of expiry date for CET articles
In order to give additional opportunities for ABDO members to gain the required CET points for continuing registration, the submission period for CET articles in Dispensing Optics in 2014 will be extended so that articles are available for approximately 14 weeks following publication.

The deadline for posted or faxed response is 18 April 2014. The module code is C-34042
Online completion - www.abdo.org.uk - after member log-in go to ‘CET online’
After the closing date, the answers can be viewed on the ‘CET Online’ page of www.abdo.org.uk. To download, print or save your results letter, go to ‘View your CET record’. If you would prefer to receive a posted results letter, contact the CET Office 01206 734155 or email cet@abdocet.infoman.org.uk
Occasionally, printing errors are spotted after the journal has gone to print. Notifications can be viewed at www.abdo.org.uk on the CET Online page

The end of the first year of the GOC's enhanced CET scheme
The second year of the GOC’s Enhanced CET Scheme has begun, and members should be on track to have gained their 36 points by the end of 2015, next year.

Don’t forget that, if you can form a small group to meet in your practice or another appropriate venue, you can generate your own CET via case discussions with colleagues. There is a guide for members on the ABDO website: http://www.abdo.org.uk/wp-content/uploads/2012/04/Generate-your-own-CET.pdf. There are also cases covering most of the competencies which can be downloaded for use in your own peer discussions in the Peer review/discussion pages of the website. To help with the use of the pre-prepared cases, the process will be explained in detail next month.

Last year, a small number of members reported some difficulties with logging in to the CET Online pages. Using the new-look website may require some minor changes to your web browser options so that cached pages are not displayed by default. Information can be found at http://www.abdo.org.uk/wp-content/uploads/2012/04/ABDO-website-login-advice1.pdf. Our technicians have reported that the previous problem is fixed - so please let the CET department know if you still cannot access the CET pages. If you sent in a fax last month, rather than completing online, please try again online with this month’s MCQs, as you will have your result more quickly than if you post or fax, particularly now that we have extended the expiry date.