Vocational dispensing

DISPENSE WITH CONFIDENCE PART 4 C-19898 O/D

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Beyond lenses that are dispensed for occupational reasons, including single vision, bifocal and progressive powered lenses, dispensing lenses for vocational reasons involves the dispenser being able to 'think outside the box' in terms of the best available eyewear solution. This can include dispensing for patients who, for example, play sport and for those who for medical reasons may require special occupational appliances. This article provides a starting point for a host of patient groups who can be greatly helped by dispensing exactly the correct lens, frame or appliance for their vocational needs.

Sports eyewear

Sport differs from other occupations in terms of the level of visual demand. Consideration for dispensing sportswear include: providing maximum visual performance, conferring ocular protection, and practicality, through spectacles or contact lenses. Sportswear must provide the widest field of view possible and should give protection against wind and dust, impact resistance, safety, and ultraviolet (UV) and infrared (IR) radiation. Other considerations include limiting distortion and aberrations. Lenses that have anti-reflection, hydrophobic, and smudge repellent properties are usually advisable. Appropriate tints which enable image enhancement using specialist filters also help under certain circumstances.

Figure 1
A selection of sports eyewear: A) Wrap-around style spectacles suitable for outdoor activities are available as glazed or B) with glazed inserts; C) squash goggles and D) diving masks are also available with fully-glazed prescriptions

General purpose sportswear

Cricketers, cyclists and runners are among the group of low-risk sportspeople who require wrap-around style frames, which allow for a greater field of view and maximum protection compared with conventional spectacles. Cosmetically, this type of eyewear is also more fashionable. Since a lot of time will be spent outdoors, people are more susceptible to damage caused by UV and so lenses should have a 100% UV protection coating. Wrap-around style spectacles are available in a limited range of powers and the lenses are usually surfaced using an 8.00D base curve on the front surface, with the back surface being individually calculated for the patient's refractive error. The finished lens will be thicker than conventional spectacle lenses, which leads to increased spectacle magnification, peripheral distortion and curvature of field. If the refractive prescription cannot be glazed into the full aperture lens ie a combined power of over approximately ±5.00D, inserts can be used and glazed such that they hold the lenses in position at the bridge. When dispensing such generic sports frames the monocular pupillary distance (PD) and the dihedral angle are necessary (Figure 1).[1]

Racket sports

It is important that players of racket sports such as squash are dispensed with goggles because a squash ball inconveniently fits the size of the human orbit. Goggles need to be certified to BS EN 7930-1:1998 (Specification for eye-protectors for racket sports eg squash). All goggles must also conform to EN167 and EN166 (Personal eye protection: Optical test methods and Specifications respectively). It is now mandatory for all doubles squash players and juniors to wear protective eyewear. Serious injury can cause hyphema, pupil injury, retinal damage and orbit (blow out) fractures where surgery is often needed and double vision or disfigurement can result. Polycarbonate or Trivex lenses should therefore be dispensed for maximum impact resistance. The dispensing of Trivex will help to reduce chromatic aberrations, compared with polycarbonate, as it has a higher V-value of 45. Nylon goggles should be close-fitting and have a silicone bridge and side shields to take any impact on the bridge of the nose and the temples, if hit by an object. Headbands are used to help keep the goggles in place (Figure 1).

Diving masks

Patients who dive or snorkel as a hobby may need to be dispensed with a diving mask. A full mask with polycarbonate frame and silicone skirt with well-fitting seal and nose-piece is the most common type of mask available. Tempered plano glass flat front surface lenses can be glazed when no prescription is required by the patient. Masks are also available with custom prescription glass-bonded lenses. All lenses will have a plano front surface in order to ensure a firm bond and to take account of the fact that the front surface is in contact with water, not air; the difference in refractive index would otherwise require the refractive power to be altered for clear distance vision. It should be remembered however, that the prescription needs to be compensated anyway due to the increased back vertex distance at which the lenses have to be worn. Alternatively, diving masks are available with glazed prescription inserts, using low base CR39 lenses, giving a wide field of view. There is also the capability to glaze an outset bifocal segment for gauge reading, for divers who are presbyopes. Tints such as yellow or magenta are available when using 4mm CR39, for improved contrast.

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Figure 2
Snooker spectacles. They have an adjustable retroscopic/pantoscopic angle of tilt at the side's hinge

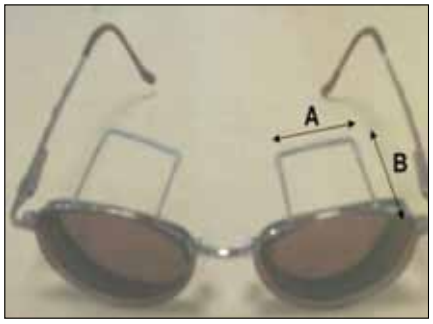

Figure 3
Spectacles with ptosis props. A) Length of the support needed and B) distance the prop lies from the back plane of the spectacles to the upper lid are the measurements which will be required by the manufacturing laboratory

Figure 4
Recumbent spectacles provide great relief to people who are bedridden or stuck in a supine position as they enable them to read

Snooker spectacles

Snooker spectacles have large lenses with an adjustable pantoscopic/retroscopic (negative) tilt. With a large retroscopic tilt these spectacles allow the user to look down the table when playing snooker, billiards or pool (Figure 2). The dispenser will need to put the tilt to a maximum and measure the optical centres (OCs) and then set the tilt to minimum and re-take the OCs at this point. The OCs to be ordered should be the mean of these two measurements. Aspheric lenses, bifocals and progressive powered lenses should be avoided as adjusting the tilt of the frame will alter the position of the vertical OCs. Spherical single vision lenses ought to be dispensed with an anti-reflection coating to help prevent reflections and glare. Suitable materials are CR39 or Trivex as they have high enough V-values to ensure that there will be minimal colour fringing. Polycarbonate, therefore, is not a suitable material as it has a low V-value of 30 which would cause problems during play in terms of the player being unable to distinguish between the coloured balls due to coloured fringing. Snooker frames have large eye sizes and are normally supra or rimless in nature so that the player is not adversely restricted by a thick rim. Frame fronts also have low crest heights to enable the maximum distance area to be available to the patient.

Shooting spectacles

Shooting spectacles can contain a relevant filter to enhance the object being aimed at against its backdrop. A red/brown tint is helpful for skeet, woodland and clay-pigeon shooting as the filter cuts out blue light and heightens violet/indigo transmission, thereby making the object more visible against the backdrop of the sky. Yellow (sodium) tints should be dispensed for black on white target shooting, which also improves contrast. Targets may vary in colour, however. For orange targets use an orange tint. Red and pink tints are good for black and green targets and are also effective on orange targets. A red tint can improve colour differentiation for people with a colour vision problem. Tints, however, should not be too dark as this will result in an enlarged pupil, which can adversely affect the patient's performance due to increased aberrations. Shooting spectacles have an adjustable aperture to allow maximum clarity and reduce blur circles. The dominant eye is used while shooting so an occluder may be required in front of the other eye to produce a monocular correction. Polycarbonate or Trivex lenses are suitable materials to dispense for impact resistance/safety purposes.

Skiing

Skiing is a highly popular activity and so many patients will require advice on the most appropriate eyewear for them. For those who have a refractive error, a wrap mask with a prescription insert should be advised. Large wrap-around frames should be dispensed to protect the whole eye area or even ski masks, which give a single shield wrap around the face. The frames are made from a soft material eg nylon, rubber and cellulose propionate, because they can hold their shape and do not become brittle easily in the cold. Polycarbonate lenses are suitable for skiing masks and goggles for impact resistance, strength and anti-fog properties. UV protection of 100% (up to 400nm) is essential due to the high levels of UV that are inevitable at high altitudes and due to high degrees of reflectance from the snow. Patients should be aware of dangers of snow blindness (damage to cornea caused by excessive UV exposure) and so the need for suitable protection. Lenses should be tinted to approximately 15% light transmission factor and various colours (usually grey or amber) are available to improve contrast, depending on their use. Mirror tints are advisable in order to help reflect back UV. Photochromic lenses are also an option as the lenses react most effectively in cold regions and when exposed to high levels of UV.

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Figure 5

Figure 5. A variety of low vision aids: A) These are +6.00D prismatic half eye readers; B), 4x hand magnifier; C), 4x near binocular spectacles; D), 4x distance telescopic binoculars; E) 11x (+40.00D) illuminated magnifier

Polarising lenses ideally should not be dispensed as skiers need to use horizontally reflected light to ensure ultimate vision in all conditions.[2]

Special occupational appliances

Ptosis props

These are a useful device to be dispensed to patients who have a ptosis (droopy upper eyelid). They comprise metal supports which are fitted through soldering to the back plane of metal spectacles. The measurements required for dispensing are the length of support needed (Figure 3A) and the distance the prop lies from the back plane of the spectacles to the upper lid (Figure 3B). The props are covered in silicone for comfort.

Ptosis may arise from trauma to the levator palpebral superioris muscle or oculomotor (3rd) nerve palsy. This ptosis could be caused by an underlying medical condition such as diabetes mellitus, brain tumour or myasthenia gravis amongst others. Ptosis props are also useful for patients who suffer from blepharospasm. Patients sometimes have ptosis props as a short-term measure while they are awaiting further treatment such as botox injections. It is important to remember that when using ptosis props, the eyes cannot blink as freely and so will dehydrate. Therefore, eye lubricants should be recommended to patients in order to help improve comfort and reduce the risk of exposure keratitis.

Recumbent spectacles

Recumbent spectacles (Figure 4) were originally designed to aid bed-ridden patients who need to read. Normally, reading while stuck in a supine position involves elevation of the book or undue depression of the eyes. By mounting a pair of reflecting (mirrored) prisms in front of prescription lenses the patient may then comfortably hold their reading material and direct the visual axes ahead while gaining a good view of the text. The prism displaces the image and the mirror reflects the image back to the eye. The reflecting prisms may be tilted by means of attaching a swivel joint to the frame thereby enabling the patient to adjust the position of the book for comfort. The prisms should not be independently adjustable and should be securely mounted in a rigid frame in order to avoid inducing unwanted diplopia. With a suitable correction behind the prism, the spectacles can be glazed for either reading or distance activities.[3]

Low vision appliances

The GOC requires that low vision patients can only be dispensed by qualified and registered dispensing opticians, optometrists and pre-registration students under full supervision. Low vision aids (LVAs) fall into one of the following groups: simple magnifiers, spectacle magnifiers, telescopic spectacles and low-power projectors.

Simple magnifiers are high powered positive lenses available from 1.5x magnification to 20x and are available in hand-held, stand and hands-free forms. They may be either non-illuminated or illuminated. These magnifiers are inexpensive, easy to obtain and are tolerant of poor technique. These magnifiers are held close to the subject matter, which is at a standard near working distance from the eye. When dispensing up to 4x magnification the simple magnifier is easy to use with a flexible working distance and usually has a relatively large lens area (Figure 5C). If using over 4x magnification, the use of the magnifier becomes more limited. Strong magnifiers will need to be held very close to the subject matter and the working distance is always dependent on lens power (Figure 5B). The distance from the magnifier to the patient's eye needs to be optimal in order to maximise magnification and the field of view attained. Small magnifiers give greater magnification while larger magnifiers provide a larger reading area but increased distortion and colour fringing.

Spectacle magnification is calculated by dividing the lens power (F) by 4 ie spectacle magnification = F/4. For example, a magnifier of +20.00D power will provide a magnification of 20/4 = 5x.

Patients should always be advised that they need to wear reading spectacles when using a stand magnifier, as the emerging light is divergent. Also, bear in mind that magnifiers will always magnify spaces between words, which will make reading a far slower process than normal. Magnifiers should always be held firmly when being used and illumination should be maximised whether externally or from within the magnifier itself. A hand tremour becomes an issue for those patients who may need to hold a magnifier and so for such patients a stand magnifier would be preferable. This allows the patient to maintain a constant and stable working distance from the magnifier to the object in question.

Spectacle magnifiers typically comprise one high powered plus lens or a lens combination that overall provides a high plus power, and these are mounted close to the eye. Binocular magnifiers comprise a pair of lens systems designed to enable binocular viewing at near. Normally, such near binocular magnifiers incorporate base IN prism in each lens, which helps to relieve the amount of convergence the patient needs to exert. Prismatic half eye reading spectacles (Figure 5A) prove to be a commonly dispensed form of LVA too. Such binocular magnifiers are also useful for certain occupational and vocational purposes, for example jewellers and stamp collectors who spend long periods of time viewing very short working distances.

Telescopic spectacles can be dispensed for patients requiring help with distance (Figure 5D) or near vision (Figure 5E). These LVAs work

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on the basis of a Galilean telescopic unit, which is a two lens system with one positive and one negative powered lens. These allow hands-free usage, a relatively good field of view, and excellent optical performance. The working distance required is short and for this reason the patient will need to be advised that they may experience eye strain if usage is too prolonged.[4,5]

Low-power projectors and CCTV systems are a more recent introduction to low vision dispensing. They allow the printed word to be projected on a screen and viewed under varying levels of magnification. Some of these devices will fit into the palm of your hand and have the facility to maximise contrast and will magnify to approximately 11x at the touch of a button.

Conclusion

This article has only scratched the surface on what is a wealth of possible examples for dispensing for vocational reasons. This area of dispensing can be very enjoyable and rewarding, especially as the practitioner can facilitate comfortable, safe and enjoyable participation in vocational activities for patients who carry out sports and other activities as a hobby and/or who may require eyewear solutions due to certain medical conditions.

About the author

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1. Which of the following do sports eyewear NOT have to provide?
a) Ultraviolet protection
b) Wide field of view
c) Impact resistance
d) Hydrophilic coating

2. Which is the British Standard specification for eye-protectors for racket sports (squash)?
a) BS EN 7930-1:1998
b) BS EN 7900-1:1998
c) BS EN 7930-1:2012
d) BS EN 1930-1:1998

3. Which lens material should NOT be dispensed in snooker spectacles?
a) CR39
b) Polycarbonate
c) Trivex
d) 1.6 index (spherical)

4. What wavelength does a UV filter need to absorb to provide 100% protection against UV, for a skier?
a) 380nm
b) 360nm
c) 260nm
d) 400nm

5. Which medical condition will have symptoms that CANNOT be assisted by a ptosis prop?
a) Myesthenia gravis
b) Blepharospasm
c) Glaucoma
d) Brain tumour

6. A magnifier has a lens power of +12.00D. What is the magnification?
a) 5x
b) 1.5x
c) 3x
d) 6x

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