Core subject 4

Optical appliances

The core subject for both dispensing opticians and optometrists is the same. However, as may be seen by the categories below, there is a different emphasis for each of the professions.

DISPENSING OPTICIANS

The ability to dispense an appropriate optical appliance.
- The ability to dispense optical low vision aids.

OPTOMETRISTS

The ability to prescribe and to dispense appropriate optical appliances.
- The ability to advise on the use of, and to dispense simple low vision aids including: hand and stand magnifiers, typoscopes and hand-held telescopes
- An understanding of the application of complex low vision aids, such as spectacle-mounted telescopes, CCTV.

Common LVA problems

It is very important that when issuing a low vision aid clear explanation of the use of the aid is given. It is also useful to be fully aware of the levels of magnification gained so that the patient expectations may be realisable.

One of the commonest reasons for an aid being rejected or simply locked away in a drawer is that it is used inappropriately. An excellent example of the potential pitfalls is to think about a hand magnifier. This may seem the simplest of optical appliances and yet it is often poorly prescribed or wrongly used.

Effective magnification: what the patient actually achieves.

The closer the aid is held to the object, the less will be the effective magnification.

Maximum magnification is achieved when the magnifier is held at the focal length of the lens which, for example, for a +10D magnifier will be 10cm. However, at this distance the patient will experience maximum distortion and the smallest field of view. Therefore, it is easier for the patient if the magnifier is held slightly closer to the page. For this reason it is usually found that two different patients may have very different magnifications from the same hand magnifier.

Which spectacles?

Remember that the use of a hand magnifier is a dynamic system. Both pairs of spectacles, reading and distance can be used but the position of the hand magnifier in relation to the object will vary depending upon the emergent vergence of the overall system.

A patient wearing their distance prescription will hold the hand magnifier closer to the focal point of the lens than the patient wearing a near correction. As the aid is a dynamic one, patients will tend to position the magnifier relative to the page such that the clearer image is found. So for distance spectacles, they will hold it further from the page. More typically, the aid is used in conjunction with a reading addition and so the aid will be held closer to the page than the focal length of the lens.

Another useful point to remember when trying to decide whether a patient is achieving the desired magnification with their hand magnifier is to note the distance between the aid and the spectacles.

The hand magnifier and the reading addition in the spectacles combine to dictate the overall magnification. The equivalent power of the system is equal to the sum of the powers of the reading add (Fa) and the magnifier (Fm) minus the product of the two powers and the separation between them (z) thus:

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\text{Equivalent power} = Fa + Fm - (z Fa Fm)
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So in Figure 1, if the spectacle add is +2.50D and the magnifier +20.00D, then if the separation is 5cm the equivalent power will be +20.00D (which is eight times the power the patient presented with. If $z$ is zero then the equivalent power will be 22.50 (nine times the starting value). Only when $z$ gets larger does the magnification reduce.

It is very important to demonstrate clearly to the patient the use of a hand magnifier. The magnifier should be moved away from the object viewed until the image is found (usually when the aid is held just closer than its focal length from the object).

Keeping this aid-to-object distance constant, the eye may then be moved closer to the magnifier to improve the field of view, but bear in mind the effect this distance has upon the magnification achieved.