Helping visually impaired patients with reading

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With an ageing population, eye care practitioners are increasingly likely to see patients with low vision requirements. The purpose of this article is to give practical advice to optometrists and dispensing opticians who want to help their low vision patients bridge the gap between what they are able to see to read, and what they want to read.

Learning objectives
To obtain relevant information from low vision patients to determine suitable interventions (Group 1.1.1)
To be able to dispense simple low vision aids (Group 4.2.1)
To understand the use of specialist charts to measure function in low vision patients (Group 7.1.5)

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To be able to dispense simple low vision aids (Group 4.4.1)
To understand the use of specialist charts to measure function in low vision patients (Group 6.2.1)
To understand the refraction of patients with low vision (Group 7.1.4)

About the author
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Introduction
There are estimated to be nearly two million people in the UK with ‘low vision’, and with an ageing population, this is projected to rise to around four million people by 2050. Eye care practitioners can, therefore, expect to see more patients with low vision in both primary and secondary care practice requiring their services to help them optimise their residual vision.

While definitions of what constitutes ‘low vision’ are varied, and may include reference to the level of visual acuity or visual field, from a practical perspective it can be helpful to consider a patient as being ‘visually impaired’ or having ‘low vision’ if their vision does not allow them to see what they want to be able to see. This functional definition not only includes those with eye disease that significantly reduces visual acuity or visual field, but also those with less impairment who have more demanding visual requirements.

Assess the needs
The most common task that people with impaired vision want help with is reading.\(^2\),\(^3\) The first thing to determine in case history is exactly what someone means by ‘reading’. Do they want to read their restaurant bill, or the whole of War and Peace? The former would be an example of ‘spot’ reading, where just a few details need to be picked out accurately. The latter would be considered ‘fluently’ reading, where the text needs to be read relatively easily for a reasonable period of time. Finding out as much as possible about the reading task will help to identify interventions that are as suitable as possible, and seeing examples of the reading tasks the patient has in mind can be very useful. The size and contrast of the print, and the desired duration of the task are useful to know, as are the required working distance, and if there is any need for writing as well as reading.

Location is also important; will the patient be sat in a chair or at a desk, or even standing in a shop, and what lighting will be available?

Functional assessment
Having determined what the patient would like to be able to achieve, the next step is to determine the patient’s baseline reading function. In research, reading function is often assessed using MNREAD charts (see Figure 1).\(^4\) These charts consist of single sentences of consistent structure (60 characters over three lines) with a logarithmic decrease in print size as one reads down the chart. If the time taken to read each sentence is assessed, these charts allow the measurement not only of reading acuity, but also the useful parameters of the critical print size and the maximum reading speed, which are depicted in Figure 2. At large print sizes (the left of the x-axis), reading speed is not limited by print size, but is read at a maximum rate limited by verbalisation or reading skills. As print becomes smaller (moving towards the right on the x-axis), there comes a point at which the size of the print starts to limit reading speed, and reading starts to slow. This ‘knee point’ on the graph is the critical print size (CPS) and represents the smallest size of print that can be read at the maximum reading speed. Moving to smaller print sizes still, the reading acuity is the smallest print size that can be read at all. Fortunately, these parameters can also be assessed in a pragmatic way with a standard Faculty of Ophthalmologists’ test chart or other similar N point chart more commonly found in practice (see Figure 1). Baseline reading function should be assessed with the best distance correction, plus a standard reading add, such as +2.50D at 40cm. Start with larger print, and ask the patient to read a sentence or so of each size before moving on to the next smallest, noting for each size whether the patient is reading confidently or hesitantly. The last size managed before the patient starts to slow down their reading is the CPS, and the smallest size they can manage at all is the reading acuity. This additional parameter of the CPS is very useful to be able to quantify patients’ common comments along the lines of ‘Well, I can see N5, but I wouldn’t want to read it for a long time’. There are limitations to this method, firstly in that reading speed is only judged, rather than measured.

Another notable limitation is that print sizes on most N point charts do not include sizes large enough for people with more impaired vision to read at their maximum speed, or small enough to assess threshold acuity for those with normal vision. A logarithmic progression near chart such as the MNREAD, or a Bailey-Lovie near word chart,\(^5\) can be useful to extend the range of measurement if needed.

While measuring baseline visual function, it can also be useful to assess contrast sensitivity (CS). The classic CS chart is the Pelli-Robson,\(^6\) but use of this chart has not caught on in practice.\(^7\) Alternatives include the drawer-sized Mars charts,\(^8\) or screen based options using test chart software (for example www.thomson-software-solutions.com) or iPad apps (for example ridgevue.com). The charts assess sensitivity to contrast of constant sized large letters which are above the acuity threshold of most patients. CS can be a useful predictor of likely function (but it does not prevent a low vision assessment being done if CS measurement is not available to a practitioner.)
From the case history and assessment of baseline function, an estimate can be made of whether the patient is likely to be able to bridge the gap between their current and their desired reading function, and what magnification or type of intervention is likely to be needed.

If using an N point chart to predict the magnification that a patient requires to meet their needs, divide the current size of print that can be read by the required size of print. For example, if a patient can just read print of size N24 (reading acuity) and wants to be able to make out print of size N6 on shopping receipts, then the required magnification would be approximately 24/6 = 4x to turn the N6 print into print of a size of N24 that can be read. However, if a patient wants to read text with some fluency, when reading a newspaper or a book, we need to magnify the print so that it becomes the size of the baseline comfortable CPS rather than the reading acuity. For example, consider a patient who has a CPS of N10 and a reading acuity of N5. They want to be able to read print of size N5 comfortably, but can only just see it at present. The magnification required is calculated by taking the baseline CPS of N10, and dividing by the desired comfortable print size of N5, giving a requirement of 2x magnification. Note that 2x is often the difference between the magnification required for just being able to read something and reading it fluently.9,12

As well as predicting the amount of magnification a patient is likely to need, it is also helpful to judge whether a patient is likely to respond well to magnification before starting to demonstrate low vision aids. From clinical experience, some patients respond very well and read their target print aids. From clinical experience, some patients before starting to demonstrate low vision is likely to respond well to magnification a patient is likely to need, it required for just being able to read something and reading it fluently.9-12

Fluently if baseline near acuity is better than 1.0 LogMAR (equivalent to 4M, or N42 at 40cm).

Selecting the aids
Having considered whether the patient’s reading goal is realistic, and what level of magnification is an appropriate starting point, it is now time to put into place aids that help bridge the gap between current function and the desired reading task. Firstly, it is always worth advising on lighting, but especially when CS is poor. Good lighting will not improve contrast (as it illuminates both the darker and lighter elements of text by the same amount), but better lighting will maximise a patient’s sensitivity to lower contrasts. ‘Good’ task lighting for reading would be a light that provides an increased level of illumination without producing glare. The concept of the inverse square law is a particularly important point to get across to a patient, that it doesn’t really matter how bright a light bulb is, but if it can be adjusted to be used very close to the reading material it will be of most benefit. Adjusting the position of the light such that it does not shine into the patient’s eyes will also minimise glare. These concepts can easily be demonstrated by showing a piece of text illuminated by an angle-poise lamp and varying the position of the lamp, and stocking such a lamp in practice might be considered.

In terms of magnifying aids, the simplest method, which can be undertaken in any practice, is to use a higher-addition reading lens. Increasing the addition reduces the working distance, giving the text a larger angular size, although patients may need encouragement to adopt closer reading distances. To calculate the required add, multiply the current add by the magnification required. For example,
a patient needing 2x magnification based on measurements taken with a +2.50D add will need around a +5.00D add. Higher powered adds provided binocularly may require provision of some base in prism to aid convergence, or prescribing the add monocularly to the better eye. Such high adds are thus often better prescribed as single vision reading spectacles, leaving the add in any multifocals at a lower value more suited to general tasks, such as cooking.

Many patients with mild visual impairment simply require an accurate refraction, a good light, and an increased reading add, to allow them to read adequately. However, simple low vision aids based on positive lenses could also be considered for stock in practice. In the low vision clinic at Anglia Ruskin University we find the low vision aids pictured in Figure 4 to be particularly popular. The wide neck (or suspended, or chest) magnifier is available with 2x magnification, and is useful for hands-free tasks, such as writing or needlework. They also have a wide field of view, which patients appreciate. We often combine one of these magnifiers with a slightly increased addition to provide a little more magnification.

Brightfield, or dome magnifiers, are again available with 2x magnification; these are reasonably inconspicuous, looking much like a paperweight, and are easy to move across the page for tasks that can be rested on a flat surface. Although non-illuminated, they provide a reasonably bright image. If a little more magnification were required, illuminated hand magnifiers can be obtained with magnifications of up to around 10x, although up to 4–5x would be entirely adequate for use in primary care practice.

The illuminated hand magnifiers are usually more positively rated by patients than the non-illuminated equivalents; the increased weight from incorporating batteries is more than compensated for by the flexibility added by the bright LED light in the magnifier. Finally, pocket magnifiers can also be obtained in a range of magnifications, and can be very useful for tasks out of the home, such as shopping. Remember that different magnifiers will be most suited to different tasks or environments, and the patient may need more than one magnifier. Obviously, there are many more optical low vision aids available than these, plus an increasing range of electronic aids providing magnification. In terms of increasing a practitioner’s options for prescribing in the case of patients with some additional needs for reading however, these are the aids that the author most commonly uses, and represent a useful starting point. These simple solutions have the potential to be helpful for many patients with impaired vision, but there will of course be patients for whom such straightforward interventions are not enough. In these cases, practitioners are encouraged to refer their patients to more specialist services, such as their local hospital low vision service or voluntary sector resource centre, giving details of a patient’s visual function and needs. Additionally, signposting patients to other relevant support services is of great value to patients: finding out who offers what services in low vision in a given location can be difficult, even without impaired vision. Local voluntary sector groups for the visually impaired can be found through the Visionary website (www.visionary.org.uk), and practitioners are encouraged to make contact with their local group if they have not already done so.

**Conclusion**

Little or no specialist equipment or devices are needed to take the first steps in helping those with visual impairment to read more easily. By dealing with the patients whose requirements for reading are relatively straightforward in community practice, patients can have their needs met locally without additional trips to a hospital, and specialist services can be freed up for those with greater need.

**Figure 3** Flowchart indicating the likelihood of being able to read print of size 1M (N10 Times New Roman) with a magnifier based on results of baseline measurement of reading acuity and contrast sensitivity. Reproduced with permission from: Latham K, Tabrett DR. Guidelines for predicting performance with low vision aids. Optom Vis Sci 2012;89:1316–26

**Figure 4** Commonly prescribed low vision aids in the Anglia Ruskin University Eye Clinic. From left to right: wide neck (suspended, chest) magnifier, Brightfield (dome) magnifier, illuminated hand magnifier, pocket magnifier.

**MORE INFORMATION**

**References** Visit www.optometry.co.uk/clinical, click on the article title and then on ‘references’ to download.

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