Illuminating task lighting

BY JANET POOLEY

Good lighting is always important but especially for patients who are visually impaired. **Janet Pooley** provides an overview.

Figure 1: A traditional standard lamp is a good lighting source for reading.

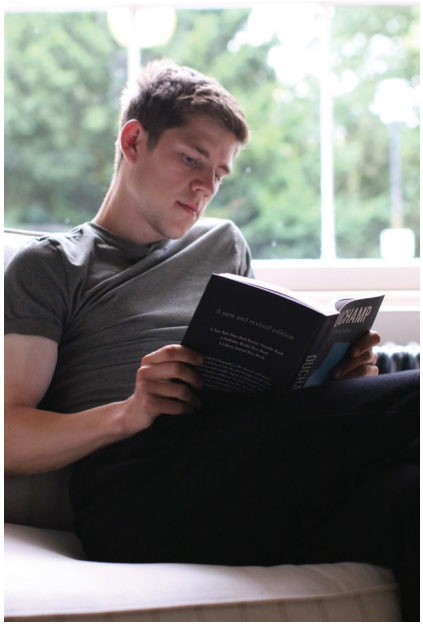

Figure 2: Sitting with your back to a window maximises natural lighting.

Figure 3: An angled lamp at a desk, with a modern LED bulb, provides excellent task lighting.

We tend to discuss lighting with patients when their vision is reduced, and where we are considering higher reading adds or low vision aids. However, even patients whose visual acuity remains fairly good can benefit from advice about lighting. Conditions within the consulting room are optimal for visual performance; this is not the case in the home or in some shops, restaurants or public buildings.

The transmission of light through the crystalline lens tends to reduce due to age, but age is only one of many factors [1]. Genetics, lifestyle, medication and systemic conditions all play a part in the amount of light that is transmitted to the retina. Clearly, as a patient develops a cataract, adequate lighting becomes especially important to maintain the ability to conduct daily tasks. Further, when macular disease and other conditions affecting vision are a factor, the correct lighting plays a vital part in ensuring that vision is optimised. This includes ensuring that glare does not adversely impact acuity.

Homes are not necessarily set up to optimise our ability to undertake tasks [2]. Rarely has a lighting designer been present to ensure that the position of the lamps and wall lights optimise the light to read or navigate the space. Light fittings around the house are most often selected for their aesthetic value with little thought to their practicalities. With a reducing ability to adapt to changes in lighting levels with age, even lighting levels are required around the home of an older person, particularly ensuring that stairways are adequately lit to reduce the chances of falling [2].

Light bulbs

The light bulb market has changed considerably in recent years. The phasing out of incandescent light bulbs began in 2009, and this has been followed by the ban of directional main-voltage halogen bulbs in 2016 and a move to phase out non-directional halogens. Suppliers are able to sell on remaining stock, and so some of these bulbs are still available, but in the main, lightbulbs are now light emitting diodes (LEDs) or compact fluorescent lamps (CFLs). Halogen bulbs were known for their good quality light and are still available to buy for dimmable and decorative lighting [3].

CFLs are cheap and widely available in a range of sizes and outputs. Older CFLs were slow to brighten which gave them a bad reputation, but this has improved considerably in recent years. These bulbs are four times more efficient than incandescent bulbs.

Considerably more energy efficient are the LED bulbs. They use almost 90% less energy than a traditional incandescent. LEDs are usually more expensive to buy, but should last for up to 25 years; in the long-term they are the cheapest option. An LED could save you more than £180 in energy use over its lifetime, compared with an old-style incandescent bulb [4]. LEDs have also been shown to improve performance in spatial and verbal memory tasks when compared with performance under fluorescent lamps [5].

The brightness of a bulb is measured in lumens. This is different from the wattage which is a measure of the energy transfer (joules per second). Energy efficient bulbs require an awful lot less energy to produce the same level of lighting and so it is much more appropriate to classify bulbs by their brightness. A reading lamp would measure 400+ lumens and room lighting would be over 1000 lumens.

LED bulbs have gone through the greatest

transformation in terms of design and their 'colour temperature'. Measured in kelvins, the colour temperature indicates the colour of the light that the bulb will emit. For example, on the Kelvin scale, the warm yellowy light given out by the old incandescent bulbs is 2400K and candlelight is only 1500K. A clear blue sky is upwards of 15,000K.

Light sources also have a colour rendering index (CRI) score. This is the ability of a light source to accurately represent different colours; a value of 90 is considered good. It should be noted that not all of the new lighting sources have good colour rendering scores and can be as low as 80. For colour matching in clinical practice LED tubes with CRI scores of 95 are available.

Lighting around the Home

The inverse square law describes the intensity of light at varying distances from a light source and is the key to understanding how to correctly advise a patient on task lighting. The intensity of light is inversely proportional to the square of the distance from the source and explains why the central light in the room will not always be the ideal light source for reading, especially with home lighting.

Task lighting should be positioned below eye level, ensuring that the light source shines onto the task and not into the eyes. The general room lighting should also remain on. The television drama scene of a detective working late into the night under an angled desk light in a pitch dark office is not conducive to comfortable task working, or general alertness.

There are essentially four categories of task lights: tabletop, floor standing, wall / unit mounted and hand-held. Their selection will depend very much on the room and the task.

In the kitchen, under unit fluorescent or LED strips, or well positioned wall lights are often adequate, especially as tasks are likely to be performed in the same position on a regular basis. Colour temperature can be higher in the kitchen too; lighting in a kitchen will be over 4000K.

Lighting for near tasks

Modern light bulbs have transformed task lighting; the inefficiency of incandescent bulbs meant that they emitted heat as well as light and there was a real danger that you could get burnt if the lamp was too close and certainly the heat could become uncomfortable if a reading lamp was used for too long. The efficiency of modern bulbs also makes portable task lighting using rechargeable batteries an option due to low power requirements.

The correct light for reading can make a huge difference. Daylight, though variable, provides an excellent source. Care with positioning is required to ensure that glare, both discomfort and disability, does not impact the task. Sitting so that the light illuminates the reading material may be tricky but can work well. North facing windows can often provide the best lighting for a desk.

Traditional standard lamps, well positioned by an armchair, are ideal for reading. Their lampshade ensures that light is directed towards the task and their design may be more acceptable in a traditional sitting room.

Angled reading lamps used in a chair, at a table or desk, or by the bedside are perfectly designed to ensure that the light source can be correctly positioned over the reading or writing material. Close to the task, a 400 lumen bulb would be ideal to light any reading material, even if the working distance was reduced and the text size was enlarged.

For patients who are visually impaired a full lighting assessment of the home can be extremely beneficial. The excellent guide 'Lighting in and around the home: A guide to better lighting for people with sight loss' by the Thomas Pocklington Trust [2] was updated last year and is an invaluable resource.

Advice to Patients

A 65-year-old person needs at least twice as much light as they needed at 21 [6]. Even without any significant ocular pathology, the ageing eye transmits less visible light and good home lighting plays a crucial role in maximising vision. The correct advice can have a dramatic impact on a person's quality of life and their ability to remain independent in their own home. Especially when prescribing reading spectacles, the importance of good lighting should not be forgotten.

References

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SECTION EDITOR

Dr Janet E Pooley,

Programme Director, NHS Education for Scotland.

E: V1jpoole@exseed.ed.ac.uk