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for Rehabilitation of  
Blind and Visually Impaired

## **L V Prasad Eye Institute**

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## **Low Vision and the Importance of Lighting**

Almost seven-eighths of all our perception of the world around is done through the sense of sight. The way objects in our world are illuminated makes a tremendous difference in how they appear to us, and how we respond to them. As we become older, the amount of light entering the eye becomes less, causing a reduction in our visual acuity, contrast perception, and colour intensity.

The type of lighting and its intensity, colour, and direction all affect an individual's visual performance. Good quality of illumination and optimum lighting conditions are important factors for better perception. It has been observed that simply ensuring the right combination of the degree and quality of illumination can work wonders for visually impaired people.

When we speak of high quality illumination we do not mean sufficient quality of light only, but also proper direction of light with the right luminance conditions, good contrast, minimal glare and right choice of light fittings. Modulated lighting where objects are highlighted for special attention by contrast and illumination helps in orientation, making it easier to focus attention. Poor lighting compounds the difficulties of visually impaired people in performing their daily activities.

### **Illuminating Solutions: Tips for Lighting and Low Vision**

Light is essential to vision, but the kind and amount of light needed to see as well as possible varies from person to person. For the visually impaired, determining the right amount of lighting is even more crucial for maximizing the usable vision. A basic knowledge and understanding of these factors can help them to find the right lighting conditions for themselves.

On an average, older people need more light than younger people. The need for more light increases approximately 10% per 10 years of age. Another important consideration is the individual visual conditions. Different eye diseases affect the way light is perceived. **More or brighter light is not always better!** For instance, people with glaucoma often require higher levels of light (due to impaired contrast sensitivity), while less light may work better for those with conditions such as cortical or subcapsular cataract.

What is the best kind of light - natural or artificial, incandescent or fluorescent? While there is no simple answer, here are some general rules:

- When light (natural or artificial) shines directly into one's eyes or reflects off a shiny surface, it leads to glare. To avoid glare, one should sit away from the window. Or one can use blinds or shades to control the amount of light entering the room. While working on a computer or watching TV, one should ensure that the screen does not face the window.
- Position lamps or fixtures directly on to the task at hand, such as books, newspapers, playing cards, pursuing a hobby or craft. Gooseneck, adjustable arm, and clip-on lamps offer good flexibility. In dimly lit restaurants, use a pocket flashlight.
- When reading or working outside, use a visor to reduce light glare.

## Types of Lighting

Good lighting is important for performing tasks like reading or sewing; it also creates a safer environment and helps to prevent accidents. A visually impaired person will need to experiment with different kinds and levels of lighting to determine what is most comfortable for him/her.

**There are two types of lighting:**

**1. General, overhead lighting, that lights up the whole room; and 2. Task lighting, or lighting used for a specific activity, such as reading.**

There are also different kinds of light and most people tend to have their own preferences. The three main kinds are incandescent, halogen, and fluorescent. However, there are several kinds of lighting, listed in order of the most useful for visually impaired people.

**1. Full spectrum lighting** is the closest to natural sunlight and the most comfortable for those with vision problems. But such lighting is not very common indoors. Full spectrum bulbs are best when used in swing-arm lamps that can direct the lighting onto the task at hand.

**2. Incandescent lighting** provides a yellower, more direct light that is good for close work, like sewing or reading. Its most common form is the ordinary light bulb, used in desk or table lamps. Incandescent lights are the least expensive to buy, but the most expensive to operate. Some have a reflector to improve light direction.

Incandescent lamps use four or five times as much energy to produce the same amount of light as a fluorescent lamp. But their life is only one-sixth to one-tenth of fluorescent lamps, and 90% of their energy goes into making heat. This can cause higher summer cooling costs, as well as reduced comfort when using them in task lighting. They often need to be positioned further away from the task, which significantly reduces the amount of lighting for the task. They are recommended for lighting hallways, bathrooms, and other frequently used areas.

**3. Halogen lighting** produces the brightest and whitest light. It is very useful in situations where a lot of light is desired, but the heat intensity of the lamp is a problem. For some visually impaired persons, it can enhance the contrast between print and background, but for others they may generate too much glare. Halogen lamps usually incorporate a reflector to provide a single beam of light, which means that several lamps are required to light a room adequately. They are therefore good for highlighting features, such as a picture on the wall, or for reading tasks. They last about twice as long as incandescent lamps, and are up to twice as much energy efficient. However they need special light fittings, which increases their cost.

Halogen lamps are available as either 240V bulbs - that are usually tubular and often used in uplighters and outdoor floodlights - or low voltage bulbs typically used in downlighting or task lights. Low voltage does not indicate low energy; to make them low voltage one needs a transformer to lower the efficiency. Halogen lamps create a lot of heat, so they must be used from longer working distances, though this reduces their effectiveness. They

can also pose a burn or fire hazard if accidentally brushed against or placed incorrectly. Touching a halogen bulb with the hands greatly shortens its life, so they should be handled with cloth or tissues.

**4. Fluorescent lighting** disperses a blue-white light evenly and without shadows over a wide area. Because it generates a lot of light without using too much electricity, it is the type of lighting most often used in public places, such as supermarkets or offices. However, it can create increased glare.

### Types of fluorescent lamps

Fluorescent lamps are of two types - compact and tubular. They are the most energy-efficient type of lighting, and do not get as hot as incandescent and halogen lamps, so they can be positioned closer to the task at hand. They are more expensive to buy, but are very cheap to use. All of them need a ballast or 'starter'. In compact fluorescent lamps this is incorporated into the base. Different 'colour temperatures' are available, which can increase comfort and reduce glare. Fluorescent lamps last from 6 to 16 times as long as incandescent lights. Their life can become shortened by frequent turning on and off (more than two to three times an hour) and so are best used where lighting is required for long periods of time, such as the kitchen and living room.

#### *a) Compact fluorescent lamps - 'energy-savers'*

Compact fluorescent lamps are designed to fit into conventional light sockets (bayonet or screw). They are available in a range of shapes such as stick or twirly; some even have a cover and look much like ordinary light bulbs! Depending on the design, some last longer than others. One must check that they fit comfortably in the light fitting - different shapes may be suitable for different situations. Compact fluorescent lamps use about one-fifth the energy of incandescent bulbs to give the same amount of light, and can pay for themselves in under a year through reduced running costs.

#### *b) Tubular fluorescent lamps - 'normal fluoros'*

These can be straight or circular. They are cheaper to buy than compact fluorescent lamps, but need different fittings. Improvements in design now mean that they are available in several colour temperatures. They flicker less, and keep their light output high for longer. They are ideal for kitchens, garages, workshops and other high-light, long-use areas. They last the longest and are the most efficient of all lights.

### Suggestions for Better Lighting

- Place the light directly where you need it. Swivel lamps are preferable, as they can be raised or lowered in order to direct the light.
- Aim the light directly on the task at hand.
- Install dimmer switches for controlling the amount of light in the room.
- Install under-cabinet lighting for tasks in the kitchen or work areas.
- Install extra lighting in places where it may be difficult to move around, such as the hallways and stairs.

- Install light switches in accessible locations.
- Install switch plates that are lighted or that contrast with the wall colour.
- Install preset light timers in difficult areas.
- Watch television in a lighted room. It is easier on the eyes. Be sure, however, that the light isn't placed where it will cause glare or reflect off the screen.
- For an overhead reading lamp, the bulb should be in an adjustable lamp, and the distance of the bulb from the page is as important as wattage. The further away the bulb, the less illumination on the page, and the closer it is, the more illumination. In fact, if you double the distance, you need a bulb four times as strong to keep the same brightness on the page. For triple the distance you need a bulb 9 times as strong, etc.
- To reduce the heat of the bulb, use a lamp with an internal reflector (a double shade). This reduces the heat significantly, and allows you to have the lamp closer to the face than you would with a single shade (especially one made of metal).

### Use of Lighting to Maximize Vision

Here are some tips for using lighting to maximize your vision:

- Provide light throughout the room along with additional task lighting near the activity. While the area of activity should be bright, the entire room must also be well illuminated to eliminate shadows. One should not work in a pool of light surrounded by darkness.
- Move lamps close to your work area. To help avoid glare, use an adjustable lamp and position the lamp to the side, rather than directly in front of you. Many people find it helpful to have lamps on both the right and left sides as it eliminates shadows.
- To prevent shadows when writing, place the lamps on the opposite side of the hand being used. Locate the bottom edge of the lampshade just below the eye level.
- To reduce glare, cover bare light bulbs of all types with shades. Soften bright light from windows with blinds or sheer curtains. Also, position the chair and table so you don't have to look directly at the light coming from the window.
- To further reduce glare, remove or cover shiny surfaces such as floors and table tops. Shiny paper can increase glare, so try to use matte paper when reading or writing.
- In hallways and stairways, provide generous amounts of light and position it so that it shines on the walls, floors, steps, and railings.
- Keep all rooms evenly lit. It is difficult for your eyes to adjust from bright light to low light, so if all the rooms are well lit, it will be more comfortable to move from room to room. Try not to walk from a brightly lit room immediately to a dark one.

### Lighting for Different Ocular Conditions

Good lighting is critical for people with compromised acuity or contrast sensitivity, although lighting needs will vary according to a patient's pathology as well as personal preferences.

Some general guidelines for providing appropriate lighting are:

- Poor contrast sensitivity scores indicate the need for extra light and contrast enhancement for most tasks.
- Patients with optic nerve damage frequently show a decrease in performance under very high illumination because of a "bleaching out" phenomenon.
- Patients with macular degeneration often need very intense illumination.
- Dimmer switches allow manipulation of light levels to suit the individual. Brightness can also be varied by changing the distance between the light source and the object.
- To prevent veiling glare, a directional light source should be placed so that it illuminates a near task but does not shine towards the patient's face. A gooseneck lamp accomplishes this and can even be moved from task to task. Diffuse light may be preferred by those who suffer from glare.
- Adequate illumination can decrease the amount of magnification required to read.

### Light Positions for Various Tasks

1. Writing or other manual tasks: Position yourself and the light so that it comes from the side opposite to your writing or working hand. This way the shadows are cast away from your task. Always ensure that you can't directly see the light bulb or tube, but the light is directed on to what you are doing.

2. Watching TV: A TV on in a dark room is glary. The room light should be turned on. Lights should be placed well away from the line of sight while watching TV.

3. Security and safety: A light outside over the front door helps identify visitors. Good lighting in bathrooms, over stairways, and in halls will help prevent slips and falls. Kitchens should be well lit.

An assessment of only the quantitative value, such as intensity of light, is only one part of good lighting. Qualitative factors of proper planning of lighting with good contrast conditions and absence of glare are also important. In conclusion, the findings emphasize the importance of lighting in enhancing the ability of visually impaired persons to perform daily activities.

**(Adapted from: 1. Personal lighting recommendations, Lighting information 2003.2 and 2. Colour, contrast and light position, Lighting information 2003.4, Queensland University of Technology, Vision Rehabilitation Centre, Brisbane, Australia)**

## Some Myths and Facts About Lighting

Light is essential to vision. The quality and quantity of light needed for comfortable, useful vision varies and becomes particularly important when the vision is impaired. Fortunately, proper light for maximum vision can be achieved based on an understanding of your needs. Let's try to separate lighting "fiction" from lighting "fact".

**Fiction: A 150 watt bulb in a ceiling light is better than a 60 watt table or a desk lamp.**

**Fact:** Ceiling lights provide the light we need to move about safely in a room. However, in order to see well enough to perform a given task, we need a strong "task" lamp. A "task" lamp shines directly onto the surface we are looking at. Thus, while sewing, reading or working on a crossword puzzle, a strong table or desk lamp would be important.

**Fiction: Everyone needs the same amount of lighting to function well.**

**Fact:** Maintaining a constant level of illumination throughout the home decreases accidents and is particularly important for the safe mobility of people with vision loss. You just can't put a price on safety!

**Fiction: The more light the better!**

**Fact:** While the average older person does require more light, it is important that glare is avoided. Glare results when light (whether natural or artificial) shines directly into the eyes or reflects off a shiny or bright surface. People with cataracts may be especially sensitive to too much light and glare. Avoid glare by sitting in such a position that an open window or light source is behind you. Task lighting should be directed onto the task and not into the eyes. Curtains, sunglasses and visors are a good way to let useful light in while keeping the glare out.

Finally, these are guidelines and not set rules. Discuss your lighting needs with your Low Vision Specialist - you may need to experiment with various types and levels of lighting to find the combination that offers you the most comfort and best performance.

(Adapted from CSBPS Public Information Series)

## VII Low Vision Awareness Programme (LAP)

A total of 27 participants including of ophthalmologists, optometrists and rehabilitation professionals from all over the country participated in the recently concluded LAP on October 1-3, 2004.

## Is your website easily accessible by the visually impaired - Check it out !

### What is 'aDesigner' ?

The aDesigner is a disability simulator that helps web designers ensure that their pages are accessible and usable by the visually impaired. Voice browsers and screen readers read aloud the text on Web pages and are used by visually impaired people. However, these devices are less effective with certain kinds of content, such as highly graphical material. Web developers can use aDesigner to test the accessibility and usability of Web pages for low vision and blind people.

### How does it work?

The tool looks at elements such as the degree of colour contrast on the page, the ability of users to change the font size, the appropriateness of alternate text for images, and the availability of links in the page to promote navigability. The tool also checks the pages' compliance with accessibility guidelines. The result of this analysis is a report listing the problems that would prevent accessibility and usability by visually impaired users. In addition, each page is given an overall score. With this information, Web developers get immediate feedback and can address these obstacles before the pages are published.

### Low Vision Awareness Programme

March 18 - 20, 2005

September 23 - 25, 2005

### Short term fellowship programme in Low Vision Care

Two-month programmes for ophthalmologists and optometrists begin on January 1, April 1, and July 1, 2005. The programmes are supported by the Sir Ratan Tata Trust, Mumbai, India. For details contact :

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**VISION REHABILITATION CENTRES**

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**You can help the Vision Rehabilitation Centres of L V Prasad Eye Institute in several areas, such as discovering basic causes and treatment strategies for eye disease through research, restoring the vision of a poor patient, or helping to expand the frontiers of ophthalmology.**

**Contributions to the Hyderabad Eye Institute or the Hyderabad Eye Research Foundation are tax deductible. Donations above Rs 250 are exempt under Section 80G of the Income Tax Act, 1961 for Hyderabad Eye Institute and under section 35(i) (ii) for Hyderabad Eye Research Foundation.**

**You Can  
Make A  
Difference**

**For more information please contact :**

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