



LOW VISION DEVICES – NON-OPTICAL

AUTHOR (S)

Hasan Minto: Brien Holden Vision Institute, Pakistan

Rituparna Ghoshal: LV Prasad Eye Institute, India

PEER REVIEWER (S)

Jill Keefe: Centre for Eye Research Australia (CERA), Melbourne, Australia

Pirindhavellie Govender: University of KwaZulu Natal (UKZN) Durban, South Africa

INTRODUCTION

This chapter includes a review of:

- What are low vision devices
- What are non-optical low vision devices
- Categories of non-optical devices

WHAT ARE LOW VISION DEVICES?

Low vision devices play a vital role in enabling people with low vision to join in their everyday activities and also assist in promoting independent living. Low vision devices are devices which enhance the residual visual function by increasing the visual information available to a person with low vision.

There are two main types of low vision devices used for people with low vision:

- Optical devices
- Non-optical devices

While optical devices consist of one or more lenses, mirrors or prisms that are placed between the eye and the object to increase the size of the object on the retina, non-optical devices alter spatial relationships and modify the environment.



NON OPTICAL DEVICES

Non-optical devices play an important role in improving the functional vision of an individual. Non-optical devices are comparatively cheaper than optical devices and are easily accessible. Non-optical devices are helpful in increasing illumination level, enhancing contrast, providing greater physical comfort and ultimately making things easy to see by modifying colour, contrast, shape, size and position.

A non-optical device is a form of assistive technology where assistive technology is “any item, piece of equipment, product, system or software whether acquired commercially off the shelf, modified or customised, that is used to increase, maintain or improve the functional capabilities of individuals with sight loss”

Commonly used non-optical devices can be classified under 7 categories as follows:

- Relative size or sometimes referred to as larger assistive devices
- Glare, contrast and lighting control devices
- Posture and comfort maintenance devices
- Hand writing and written communication devices
- Orientation and mobility techniques and devices
- Sensory substitution devices
- Medical management and life skill devices

RELATIVE SIZE / LARGER ASSISTIVE DEVICES

Large print materials are the best example of relative size magnification. They include enlarged photocopy materials and computer printouts of large font size. Though not all materials are readily available in large print, they can be made easily using technology like photocopiers. While making the large print materials, margins, spacing and type-style must be considered i.e. Arial narrow, double line spacing and 18 font size is usually recommended to prepare large print materials, however this should be determined/customised for each individual.

There are various font types, however, one should note that Arial 12 point size is called clear print, while large print starts at 14 point.

- This is an example of Times New Roman
- This is an example of Arial
- This is an example of Courier
- This is an example of Verdana

Advantages

- Cosmesis – the individual is able to read looking like a person with normal vision

Disadvantages

- Books are too heavy and bulky and therefore difficult to hold for long hours
- Less availability



NON OPTICAL DEVICES (CONT.)

GLARE, CONTRAST AND LIGHTING CONTROL DEVICES

Contrast plays an important role in enhancing the functional vision of a person. People who have low contrast visual acuity will complain about reading low contrast materials such as bills and medicine labels etc. Just increasing the illumination level could easily enhance contrast

Different eye conditions require different lighting levels:

- Patients with RP may require higher illumination hence we can recommend them to use a flashlight
- Conditions like glaucoma and cataracts produce glare and patients may benefit from the use of different tinted lenses to control the glare. Sometimes these individuals could derive benefit from simply wearing a peaked cap which would produce greater visual comfort
- Patients with albinism may require controlled or indirect lighting. In such cases, proper seating arrangements against direct sun or use of curtains / blinds will help in lighting control

Common examples of glare, contrast and lighting control devices include:

- Adjustable table lamps (Fig. 6-1)
- Adjustable wall lamps (bracket lamps)
- Adjustable clip lamps
- Halogen lamps



Figure 6-1: Adjustable table lamps

POSTURE AND COMFORT MAINTENANCE DEVICES

Most optical devices prescribed for reading require a closer reading distance. The need for the patient to bend to maintain this close working distance causes discomfort and stress.

In these situations adjustable reading stands (Fig. 6-2) should be recommended to ease some of the discomfort, thereby encouraging a comfortable body posture for the patient.

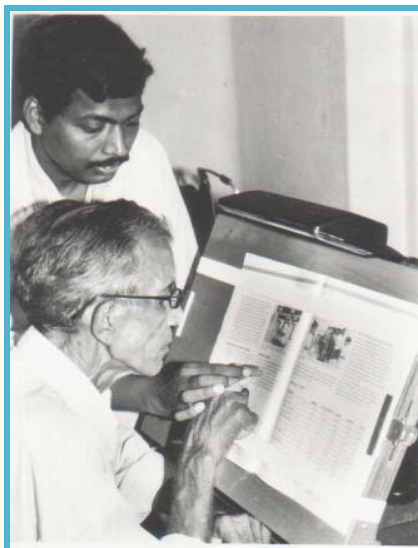


Figure 6-2: Reading stand used to ease stress of poor posture on patient



NON OPTICAL DEVICES (CONT.)

HAND WRITING AND WRITTEN COMMUNICATION DEVICES

Writing guides

Letter writers, cheque guides and signature guides are especially helpful in written communication. The guides are constructed from a piece of black cardboard which has a slit cut into it (Fig. 6-4). The black colour of the guide enhances the contrast over reading and writing materials.

Bold line notebooks

Bold line notebooks are those notebooks with black bold lines that make it easier for the user to follow the line when writing. There is usually ample space between lines. It helps the user to write legibly on the line and also helps in making reading easier.

Felt tip pen and 3B pencils

Due to the boldness of pens or pencils, the contrast automatically increases and makes reading easier. The boldness of the lead will be written in every pencil as 3B, 4B etc (Fig. 6-3).



Figure 6-3: Use of bold pens or pencils to enhance contrast

HAND WRITING AND WRITTEN COMMUNICATION DEVICES (CONT.)

Devices for writing

- Writing guides (Fig. 6-4)
- Letter writing guides
- Signature guides
- Cheque writing guides
- Envelop writing guides
- Regular markers
- Bold markers
- Writing pens with light
- Stencils
- Frame & stylus (for writing Braille)
- Slate & figures (for mathematical Braille)

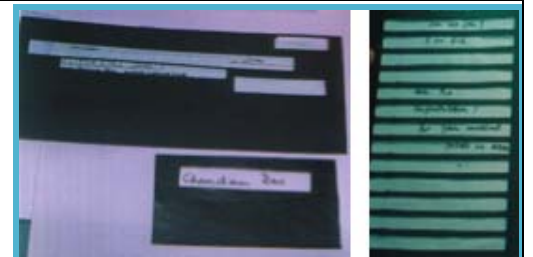




Figure 6-4: Writing guides



NON OPTICAL DEVICES (CONT.)

HAND WRITING AND WRITTEN COMMUNICATION DEVICES (CONT.)	Devices for reading <ul style="list-style-type: none"> • Reading material with enlarged & high contrast print • Typoscopes (reading guides) (Fig. 6-5) • Fixed reading stands • Adjustable reading stands. • Illuminated reading stands • An enlarged & high contrast calculator • A talking calculator • A talking dictionary • Talking books • Tape recorders • Reading material in Braille • Flash cards • Tactile cards • Cards with enlarged & high contrast alphabets, numbers, shapes, pictures, paragraphs etc. 	 <p>Figure 6-5: A typoscope (reading guide)</p>
ORIENTATION AND MOBILITY DEVICES	<ul style="list-style-type: none"> • Orientation is using the remaining senses to establish one's location in one's environment • Mobility is an art of moving from one place to another independently, safely and gracefully • Mobility canes are cost effective and easily available. It comes in folding (Fig. 6-6) and unfolding models. Training is needed for efficient use of a cane. 	 <p>Figure 6-6: A foldable cane</p>
SENSORY SUBSTITUTION DEVICES	<p>When vision is affected we tend to compensate the loss using the other senses. Hence we need to motivate a person with low vision to make better use of residual vision and the hearing, tactual and olfactory clues. Among these, hearing and tactual substitutions are mostly used for academic purposes and the olfactory sense is very much useful in life skills and mobility.</p>	

NON OPTICAL DEVICES (CONT.)

MEDICAL MANAGEMENT AND LIFE SKILL DEVICES

Pre-set Insulin syringe

This is the most useful device for patients with Diabetes Mellitus. The pre-set insulin syringe comes in large print numbers. Another model manufactured by Lilly Company “The Huma Pen” comes in large print numbers. It also produces a “click” sound upon turning the pen for each unit. So the patient can easily count the units of loaded insulin by hearing the “clicks”.

Notex

It is scientifically accepted device for currency identification (Fig. 6-7).

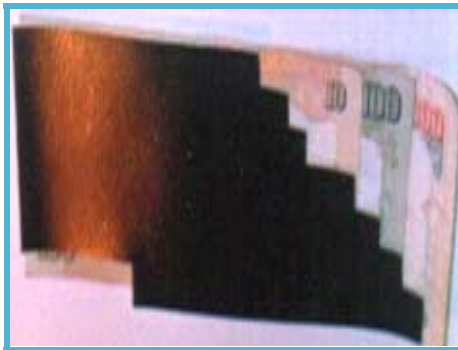


Figure 6-7: A Notex

Needle threader (Fig. 6-8) has a tiny iron string which helps in threading a needle.



Figure 6-8: Using a needle threader

Colour identifier is helpful for those who can't differentiate colours due to their vision problem. Colour identifier is a tactual identifier. The technique here is to associate the different colours the person wants to use, with different shapes of button or embroidery patterns. For example, if a triangle-shaped button for black were decided, someone would stitch a triangle button on the corner of the black colour dresses. So whenever the vision impaired person felt the triangle-shaped button they could confirm the dress colour as black.

Talking clock and watch

These are readily available at low cost and have raised buttons for numbers with a speech output option.





NON OPTICAL DEVICES (CONT.)

DEVICES FOR ADL

- Large & high contrast telephone dials & push button phones (Fig. 6-10)
- Large & high contrast wall clocks (Fig. 6-11)
- Regular but high contrast wall clocks
- Large & high contrast table clocks
- A talking time piece.
- Large & high contrast wrist watches
- Talking wristwatches
- Bright & different coloured jars labelled with names of the daily used items (hair-pins, safety-pins, needles, needle- threading devices, buttons, threads etc) to be kept in them, written in an enlarged & high contrast print.
- White crockery (2 flat plates, 2 deep plates, 2 quarter plates, 2 small bowls, 2 cups & saucers, 2 serving bowls & a dish) with black or any high contrast borders
- A cutlery set (2 dessert spoons, 2 forks, 2 tea spoons, 2 knives) with bright & high contrast handles
- A white teapot with a white pipe, a high contrast handle & a bordered cover.
- Transparent milk pot & sugar pot with dark coloured handles & covers
- Shaded water jug & glasses (black, brown, milky white etc)
- A dining table set (a bread box, a tissue paper box, a sugar pot & a set of salt & pepper & tooth picks bottles) of bright, dark & different colours

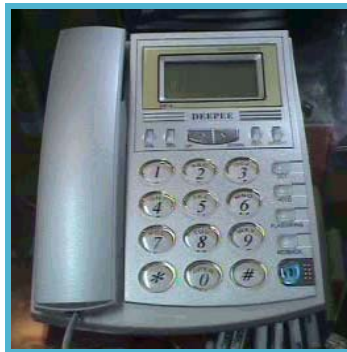


Figure 6-10: Large, high contrast telephone



Figure 6-11: Large, high contrast clock



DEVICES FOR DOMESTIC ACTIVITIES

Cooking aids:

- A high contrast stove, possibly white stove with black plates
- Pans (saucepan, frying pan, griddle, wok etc) with high contrast handle & cover
- A white enamelled cooking pan set with black handles
- A red enamelled cooking pan set with black colour inside & white handles
- A set of cooking spoons with handles of yellow colour & black border
- A set of condiment jars labelled with names of each spice written in an enlarged & high contrast print
- A set of large size white jars with bright & different coloured covers labelled with the names of cereals (rice, sugar, cereals etc) to be kept in them, written in an enlarged & high contrast print
- Kitchen tools (knives, bottle opener, strainer, vegetable crusher, peelers, cutters, lemon-presser etc) with bright colours & high contrast handles
- A vegetable cutting board of high contrast (with one side white & the other side black)



NON OPTICAL DEVICES (CONT.)

DEVICES FOR DOMESTIC ACTIVITIES (CONT.)	<ul style="list-style-type: none"> • A bright coloured vegetable rack • A lighter and a dough plate & a rolling pin of dark colour • A whistling kettle Stitching aids: <ul style="list-style-type: none"> • Needle threading devices
DEVICES FOR RECREATION	<ul style="list-style-type: none"> • Large ludo • A large chess set • A large & high contrast set of playing cards (Fig. 6-12) • Large & colourful footballs. • An enlarged & high contrast carom board with large & bright coloured goats • A TV with a large screen & bright colours  <p><i>Figure 6-12: Large high contrast playing cards</i></p>
DEVICES FOR SELF-CARE ACTIVITIES	<ul style="list-style-type: none"> • A magnifying mirror, possibly with extra illumination
DEVICES FOR HEALTH CARE	<ul style="list-style-type: none"> • A digital thermometer • A talking body thermometer • Insulin units measuring device
DEVICES FOR ORIENTATION & MOBILITY	<ul style="list-style-type: none"> • White canes • Red & white canes • Rigid canes • A sighted guide, i.e. a person trained to guide a person with low vision
DEVICES FOR COMPUTER TASKS	<ul style="list-style-type: none"> • A computer with computer & internet access technology, talking appliances, enlarged & high contrast screens & enlarged or tactile keyboards (Fig. 6-13) • A zoom text (special low vision software)  <p><i>Figure 6-13: Large high contrast keyboard</i></p>

ELECTRONIC DEVICES

In cases of severe visual loss, where optical devices do not provide adequate help, electronic devices are helpful. These are basically of two types. One displays the task in a magnified form from a television monitor; the others are conversion systems that convert text into a speech system. Some examples of other electronic devices are talking watches, talking calculators, speech and Braille conversion systems. With further developments in the electronics field, more and more devices are becoming available for low vision patients. It is important to keep a close watch on these developments and advances so as to know what best option you can offer your patient.

SELECTED READING/REFERENCES

- Nowakowski R. (1994) **Primary Low Vision Care**, Appleton and Lange
- Jose RT. (1983) **Understanding low vision**, American foundation for the blind
- Freeman P. Randall TJ. (c1997) **The art and practice of low vision**, Boston: Butterworth-Heinemann
- Brilliant RL. Appel S. (1998) **Essentials of Low Vision Practice**, Butterworth-Heinemann