Low Vision and Blindness Assistive Technology Solutions

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Learning objectives

- Understand the differences between low vision and legal blindness.

- Identify three common visual impairments.

- Describe three different types of Assistive Technology utilized by individuals with visual impairments.

Definition of Visual Impairment

- "The term 'visual impairment' refers to a functional limitation of the eye(s) or visual system due to a disorder or disease that can result in a visual disability or a visual handicap."
  -American Optometric Association Clinical Practice Guideline

- Previously used defining criteria for classification of visual impairment are currently under review by the WHO
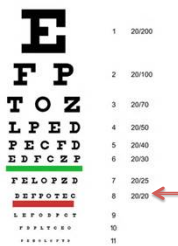
Definitions- Visual Field

- Visual field- the total area in which objects can be seen in the side (peripheral) vision as you focus your eyes on a central point.
 - Standard visual field is 155 degrees horizontally and 135 degrees vertically
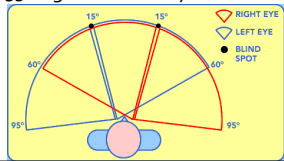
Definitions- Visual Acuity

- Visual Acuity- a number that represents the clarity or sharpness of vision.
  - "Normal" vision- 20/20 visual acuity means that a person can see small detail from 20 feet away the same as a person with normal eyesight would see from 20 feet.

Definitions- Visual Acuity

- "Subnormal" vision- i.e. 20/70 means that one must be as close as 20 feet to see what a person with 20/20 vision can see at 70 feet.
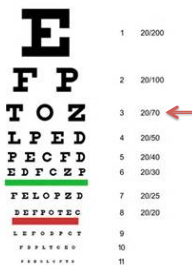
Classification of Visual Impairment

- **Visual Impairment**
  - Traditionally defined as <u>best-corrected</u> visual acuity of 20/40 or worse in the better eye
- **Legal Blindness**
  - Does not mean a person has no residual vision
  - Is a designation used for the determination of benefits (tax deductions, some VA benefits and some aspects of SSDI)
  - Social Security Act Definition:
    - Remaining vision in the better eye after best correction is 20/200 or less OR contraction of the peripheral visual fields in the better eye (A) to 10 degrees or less from the point of fixation; or (B) so the widest diameter subtends an angle no greater than 20 degrees.
- **Total Blindness**
  - The person has no useful residual vision

Epidemiology of Visual Impairment

- The incidence of visual impairment increases with age; more than two-thirds of persons with low vision are over the age of 65.[1]
- Prevalence estimates vary based on the defining criteria; however, it is estimated that there are between 1.5 and 3.4 million visually impaired adults in the US[2-5]
- The most common causes of visual impairment in adults are: age-related macular degeneration, cataracts, glaucoma, and diabetic retinopathy[1,2]

Common Diagnoses Resulting in Visual Impairment in a Veteran Population

- Ocular Diagnoses
  - Age-related macular degeneration
  - Diabetic Retinopathy
  - Glaucoma
  - Cataract

- Brain/Visual Pathway Diagnoses
 - ABI/TBI
  - Tumor
  - CVA

AT Low Tech Interventions

- **B**igger
  - Large print, magnification

- **B**righter
  - Lighting

- **B**older
  - Tools and strategies to increase contrast

- **B**orrowed (from another sense, person, or dog guide)
  - **B**umpier (tactile cues, **B**raille, long cane)
  - Auditory

Low Tech Solutions

lighting

- 20/20 pens
- bold, lined paper
- Natural or full-spectrum lighting
- handheld magnifiers
- large print publications

large print
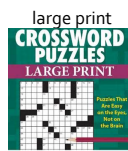
CROSSWORD PUZZLES
LARGE PRINT

20/20 pens

handheld magnifiers

bold lined paper

AT High Tech Interventions

- **B**igger and **B**righter
  - Software: screen magnification, mouse pointer enhancements, apps
  - Hardware: Closed Circuit Television (CCTV), handheld video magnifiers
- **B**older
  - Software: features in screen magnification software, apps
  - Hardware: enhanced keyboards
- **B**orrowed
  - Software: screen reading, scanning and reading, braille translation, apps and more apps
  - Hardware: talking glucometers, Scriptalk, talking blood pressure monitors, refreshable braille displays, talking GPS, auditory or "talking" commercial products, i.e. Comcast X1 talking guide, talking TV, refrigerator and microwaves
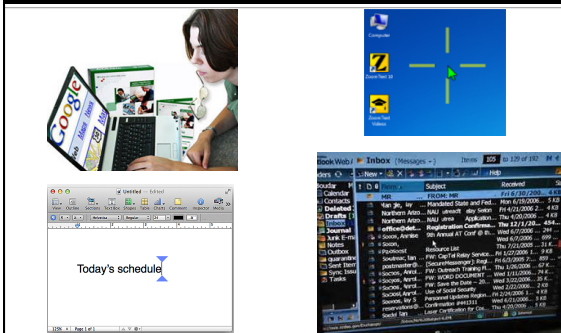
High Tech Solutions- Magnification

- Screen magnification software- Screen magnification software enlarges the text on screen and can provide users with options to adjust color and contrast.
  - Full featured programs such as Zoomtext, Magic, SuperNova provide:
    - Multiple levels of magnification, ranging from 1.25x- 60x
    - Color and contrast options
    - Addition features: cursor enhancement, mouse options, line guides, limited screen reading

High Tech Solutions- Magnification

- Freeware and shareware:
  - Some may require minimal payment after trial period
  - Multi-level magnification, clarity lacking in some
  - Adjustability of lens size or shape- often do not have full screen magnification
  - Less intuitive user interfaces
  - Little to no documentation

- OS built-in magnifiers:
  - Free utilities with fewer options
  - Multi level magnification, typically not high levels
  - Typically two color options
  - Enlarged cursor

High Tech Solutions- Magnification

High Tech Solutions- Magnification

- Desktop Video Magnifiers/CCTV's:
  - Varying levels of magnification
  - Provide ability to control contrast and brightness
  - Some allow ability to use jointly with computer
  - Either on a fixed stand or moveable arm
  - Auto-focus camera

High Tech Solutions- Magnification

- Handheld Video Magnifiers/CCTV's:
  - Portable version of a standard CCTV
  - Varying levels of magnification
  - Provide ability to control contrast and brightness
  - Auto-focus camera

High Tech Solutions- Magnification

- Large print keyboards:
  - Different color options
  - Shortcut keys for screen magnification programs

High Tech Solutions- Magnification

- Apps and built-in features:
  - Low or no cost
  - Varied features
  - Varied quality

High Tech Solutions- Auditory

- Screen reading software- are programs that allow blind or visually impaired users to read the text that is displayed on the computer screen with a speech synthesizer or braille display. A screen reader is the interface between the computer's operating system, its applications, and the user. The user sends commands by pressing different combinations of keys on the computer keyboard or braille display to instruct the speech synthesizer what to say and to speak automatically when changes occur on the computer screen.[6]

High Tech Solutions- Auditory

- Screen reading software
  - Require intermediate to advanced keyboarding skills
  - Tend to have much longer training periods than screen magnification software
  - Useful for users to have more than basic understanding of computer functioning and programs
  - Span a variety of operating systems
  - Vary widely in features and cost

High Tech Solutions- Auditory

- Screen reading software- Operating systems/Portable tech
  - Mac OS X and iOS use VoiceOver- full functioning, comprehensive screen reading
  - Windows OS using Narrator- improved considerably in Windows 8.1, more comprehensive than prior versions
  - Android using Talk Back- has improved, but other app options are better and provide more seamless reading experiences

High Tech Solutions- Tactile

- Refreshable braille- provide tactile feedback to information displayed on a computer screen via a braille "keyboard" that raises and lowers cells.
  - Must have strong knowledge of braille
  - Braille displays come in multiple cell options- 40, 70 or 80
  - Cells change with the webpage…dynamic
  - Compatible with multiple operating systems

High Tech Solutions- Scanning and Reading

- Scanning and Reading software- provide access to print text by converting to a computer file that is readable by a synthesizer through the process of Optical Character Recognition (OCR) after the document has been scanned
  - Available as stand-alone unit, software available in multiple operating systems, apps, built-in to CCTV's
  - Typically easy to use and stand alone-units and CCTV's do not require prior computer usage

High Tech Solutions- the rest...

- Multiple categories of AT that provide forms of screen reading and/or screen magnification:
  - Talking GPS- standalone, apps
  - Digital talking book players- hardware and software
  - Household products: talking appliances, talking and large print timepieces, talking and large print tools, money reader, color identifiers, thermostats
  - Medical devices: ScripTalk, talking and large print blood pressure monitors, talking and large print glucometers
  - Entertainment: Apple TV, talking cable/satellite menus and boxes, digital assistants (i.e. Amazon Echo)

Conclusion

- Think low tech first
- Abandonment high if overprescribed
- Multiple options based on diagnosis, functional abilities, goals and cost
- Trial before recommending
- Don't limit based on your own unfamiliarity
- Do you homework
- Embrace the inevitable...change!

References

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