Bonjour a tous

It’s Not a Pill, It’s Not a Cream, It’s the Lighting: Aging Vision and You

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Portland, Oregon
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Learning Objectives

Participants will be able to:

1. Understand the lighting needs of over 20% of the US/Canada population.
2. Learn about the latest trends in lighting for the older and low vision populations.
3. Understand that aging is a world-wide phenomenon and its impact reaches far beyond senior housing.

This presentation qualifies for:
One (1) IES CEU credit
An Important Global Trend

The world is aging:
2006: 11% of global population aged 60+
2050: 22% of global population aged 60+
More older people than children aged 0-14 for the first time in human history.

285 million people are estimated to be visually impaired worldwide.
About 90% of the world’s visually impaired live in low-income settings.
82% of people living with blindness are aged 50 and above.
UNITED STATES PROJECTIONS

• Population aged >65 years
  – from \( 12.4\% \) in 2000 to \( 19.6\% \) in 2030
  – 35 million in 2000 \( \rightarrow \) 71 million in 2030
  – roughly 20 percent of the U.S. population

• Population aged >80 years
  – from 9.3 million in 2000 to 19.5 million in 2030
Why is the World Aging?

High fertility after World War II

The result of:

• Reduced death rates at all ages
• Major reductions in the prevalence of infectious and parasitic disease
• Declines in infant and maternal mortality
• Improved nutrition during the 1900s
Why needs of older people must be understood:

Growth of the aging population:
• 23% USA and 25% Canadian population will be 65+ in 2036.

Increase of Visual Impairment with age
• 19% of those 70+ have visual impairment

Visual impairment impacts people of all ages
• 15 million blind/visually impaired people in the US
• Only 1/3 of employment age are in the workforce in both the USA and Canada.

Every year over 50,000 Canadians lose their sight:
• Alberta  52,899
• Saskatchewan  14,256
Canada now has more seniors than kids under 15

Source: Statistics Canada
Made with Chartbuilder
Definition of Low Vision

20/70 acuity or worse after correction

(glasses or surgery)
Overview of Normal Age-Related Changes to Vision

Smaller pupil – less responsive
Loss of focusing flexibility
More light scatter within the eye
Slower adaptation to lighting changes
Less sensitive to blue light
Reduce visual acuity
Reduced contrast sensitivity
Changes to the Lens

Lens of a 10 year old

Lens of a 65 year old
Age-Related Eye Diseases Compared to Normal Vision

Courtesy: National Eye Institute, NIH
Age-Related Cataracts

Problems
Reduced Contrast
Glare Disability
Haze in the lens
Impacts everyone, sooner or later

Treatment
Surgical removal of lens
Glaucoma

Courtesy: National Eye Institute, NIH

Problems:
Needs strong light
Reduced contrast
Loss of side vision
May lose vision for detail

Treatment:
Medication
Surgery
Age-Related Macular Degeneration

Courtesy: National Eye Institute, NIH

Problems:
- Needs good strong light
- Seeing faces, reading, details and driving
- Affects Central Vision
- Generally untreatable
- Very common
- Severity varies
Diabetic Retinopathy

Problems:
Needs good strong light
Sensitive to Glare
Damage to blood vessels in the retina
45% of diabetics have some stage of retinopathy
Type I & Type II Diabetes
Implication of Age-Related Vision Loss

Falls/Fractures Increase 200%
Limited Mobility in Unfamiliar Areas
Loss of Contrast Sensitivity
  • Limits Independence
Reduced Ability to See Fine Detail
Light for Health—Get Outside!

- Vitamin D Synthesis for Healthy Bones by light on the skin
- Maintains Circadian Rhythm by light through the eye
- Promotes Better Sleep Quality
- Prevents Depression
- Reduces Agitation
Evolutionary Past Compared To Modern Day Light Exposure

Past Times
• Bright, full-spectrum days
• Dark nights

Modern Times
• Dim, spectrum-restricted days inside buildings
• Lighted nights
Daylight Exposure Varies
Community vs. Care Facilities

Minutes of light received daily

Middle-Aged Adults: 58
Assisted Living Residents: 35
Nursing Home Residents: 2
Interior Lighting:
Repeat Nature’s Color Rhythm

Cool During the Day  Warm at Night
Causes of Age-Related Circadian Disruption

Changes to the body clock
   Neural changes require stronger light input

Less light reaches the retina
   Changes to the eye

Less light exposure
   Due to decreased mobility
   Nursing home placement
Daylighting

More daylight
Large skylights
Larger windows
Need BOTH skylights and windows not just windows
Not all Daylighting is Good!
Clear Glazing=Glare & Shadows
Not all Daylighting is Good!
Clear Glazing = Glare & Shadows
Recent Research: Utilizing Bright Light & Melatonin

Study in The Netherlands

12 Assisted Care Homes

- 189 Subjects studied over 3.5 years
- Average age 85.5 with Dementia

The Netherlands’ Study
Interventions

Light: Delivered between 9AM – 6PM (Measured in the direction of gaze)

Active: 1000 lux, 93 footcandles
Color Temperature: 4000K & 5000K
Placebo: 300 lux, 27 footcandles

Melatonin: Taken one hour before bed

Active: 2.5 mg
Placebo: Sugar Pill
Published Results from the Study in The Netherlands

Nightly Restlessness Reduced – 9% per year
Cognitive Impairment Reduced – 5%
Depressive Symptoms Reduced – 19%
Sleep Duration Increased (37 min.) – 8%
Older People Need High Levels of Light During the Day

But, darkness when they sleep

Or

Low Levels of Amber Light at Night For Wayfinding*

*Some research suggests that the night lighting can be low levels of white

*In practice red light has been used with success
Bathroom Lighting at Night

Bathrooms need different lighting for Day & Night

Low-light levels at night

Light should be warm in color

Light the path from bedroom to bathroom
  • Amber night lights
ANSI/IES RP-28-2007
The Standard
## Minimum Light Levels
**ANSI/IES RP-28-07**

<table>
<thead>
<tr>
<th>AREA</th>
<th>AMBIENT</th>
<th>TASK</th>
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<tbody>
<tr>
<td>Resident Room</td>
<td>30 FC</td>
<td>75 FC</td>
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<tr>
<td>Dining/Activity</td>
<td>50 FC Day</td>
<td></td>
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<tr>
<td>Bedrooms</td>
<td>30 FC</td>
<td>75 FC</td>
</tr>
<tr>
<td>Hallways (Day)</td>
<td>30 FC</td>
<td></td>
</tr>
<tr>
<td>Hallways (Night)</td>
<td>10 FC Night</td>
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</tr>
</tbody>
</table>
Key Elements to Improve Lighting to Enhance Vision from ANSI/IES RP-28-07

- Provide appropriate light for day & night
- Higher light levels during the day
- Consistent even illumination
- Eliminate glare
- Combine direct/indirect lighting
- Balance brightness of daylight
- Provide gradual changes in light levels
- Provide task lighting for daily living
Exception to IES Handbook

“Exterior residential lighting criteria discussed here apply to normal-sighted individuals living in single-family homes. Interior residential lighting criteria discussed here apply to those normal-sighted individuals living in single-family detached homes, duplexes, apartments, condominiums or other residential complexes. Individuals with specific vision impairments may require more or less light depending on the visual condition and tasks. These impairments should be identified in programming and require that the lighting be designed accordingly. [4]”

Examples of Corridor Lighting
Apartment Lighting
New Things To Come

Color Tuning

Circadian Rhythm lighting moving into the workplace

Individual controllability of luminaires

Daylight—Is it a right?
Thank you
Merci

Questions?

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