Lighting for Senior Care

Older adults, on average, receive 1/3 less light to the back of the eye. Additionally, spending most of their time inside homes with dim lighting conditions result in not enough exposure to stimulate the circadian system to entrain their biological clocks. Some signs of circadian disruption include prolonged wakefulness at night resulting in napping throughout the day, and waking up/ going to bed earlier than desired. Light stimulus is not only beneficial for circadian stimulus, but for task visibility as well as delaying the onset of dementia. Providing a robust light/ dark pattern for older adults while maintaining task visibility are design goals that every design should strive

Design techniques

	Design challenges	Design considerations
1	- The eye's lens thickens, adding more layers that absorb light so not as much gets to the back of the eye which limits visibility, circadian entrainment, and cognitive stimulus -Reduction in responsiveness of the circadian clock	Higher light levels using light tables or light trays for better visibility along with stimulus for the brain and the circadian system
2	The eye's lens thickens, adding more layers that scatter light to the back of the eye which increases sensitivity to glare	Hide sources to minimize glare
3	Can't quickly adapt to changing light levels	Balanced light levels through transitional spaces
4	Yellowing of lens absorbs shorter wavelengths, so discrimination of color is reduced with age	High CRI sources for lighting to better discriminate between colors
5	Contrast sensitivity is reduced with age	High contrast between thresholds
6	Disorientation within spaces can increase	Muted patterns to avoid disorientation and confusion
7	Home sickness from living in a nursing home	Use warm CCTs to create a home-like feel to increase comfort levels

CS schedule

<u>Choose 0.3 CS target if:</u>
- Furniture layout is defined or unchanging
- Energy usage is a major concern and personal light devices can't be used

Senior Care- 0.3 target	
Time	**CS**
7:00 AM - 4:00 PM	0.3
4:00 PM - 5:00 PM	0.3 → 0.2
5:00 PM - 7:00 PM	0.2
7:00 PM - 8:00 PM	0.2 → 0.1
8:00 PM - EOD	0.1

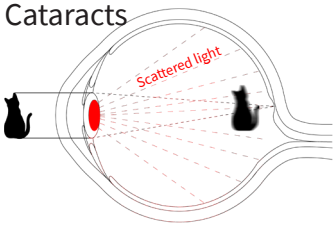
Senior Care- 0.4 target	
Time	**CS**
7:00 AM - 12:00 PM	0.4
12:00 PM - 1:00 PM	0.4 → 0.3
1:00 PM - 4:00 PM	0.3
4:00 PM - 5:00 PM	0.3 → 0.2
5:00 PM - 7:00 PM	0.2
7:00 PM - 8:00 PM	0.2 → 0.1
8:00 PM - EOD	0.1

<u>Choose 0.4 CS target if:</u>
- Warmer CCTs are used due to higher light levels needed to acieve 0.4 CS. This will increase light levels on the work plane for task visibility
-Light tables or light trays are used

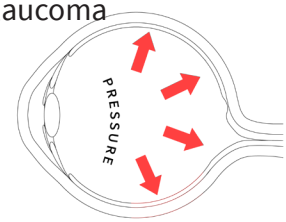
Aging eye diseases

With retinal and pre-retinal changes to the eye, older adults can undergo visibility challenges like the ones below. When designing senior care facilities, be mindful of certain visibility challenges.
Since some of the diseases destroy the photoreceptors, light cannot bring them back, but rather enhance the use of the remaining ones.

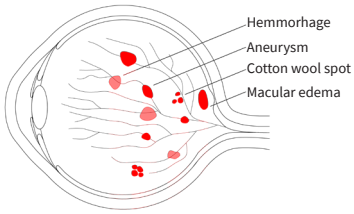
Cataracts



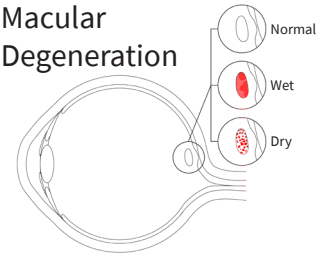
Glaucoma



Diabetic Retinopathy



Macular Degeneration



Additional light devices

Daytime solutions

Light tables and trays are useful devices for providing light stimulus for older adults during the daytime. These lighting devices can stimulate the circadian system as well as provide cognitive stimulation. This can improve mood and cognitive functioning. These devices can be used while doing daily activities such as eating.

Night-time solutions

Falls are a major concern within the older adult community. Especially when getting up to use the bathroom at night, falling due to the inability to orient oneself is a common occurance. Giving visual cues to promote postural control, such as a horizontal light bar can aid in stability when standing up. Lighting doorframes and handrails can also be beneficial.