

FOCUS on AGING

OUR EYESIGHT BEGINS A SLOW DECLINE STARTING AT AROUND AGE 30. By 80, the amount of light we take in has reduced to one-fifth of what we do at age 20. The construction industry is paying attention. Lighting professionals and manufacturers are learning from the ongoing research of national labs and others. Replicating the quality of outdoor light indoors is one advance. Understanding successful lighting design for the elderly is another. Awareness is growing as the lighting industry reengages in how to successfully light spaces for seniors. For aging-in-place homeowners, senior communities and nursing care facilities, all eyes may turn to the electrical contractor.

By 2030, all baby boomers will be age 65 or older. They have always charted their own course. And while lighting for seniors has largely been neglected, it seems unlikely this demographic will settle for anything less than good lighting. This desire and the healthy building movement could prove transformational; understanding the effects of light on the human eye and body may be new tenets of building science.

Eunice Noell-Waggoner is the president and founder of the Center of Design for an Aging Society. Based in Portland, Ore., she advocates for better senior living in homes, public buildings and public outdoor spaces. Having worked as an interior and lighting designer, she sees good lighting as paramount to improving senior living spaces. Her

publication, "Lighting Your Way to Better Vision," was adapted in 2020 by the Illuminating Engineering Society (IES), New York.

"Seniors need sufficient natural light balanced with ambient light to safely and confidently maneuver in their living space," Noell-Waggoner said. "There is also a need for ample light to support tasks for people trying to maintain their independence. Tasks could include food preparation, reading prescriptions from a medicine cabinet, and so on. Lighting placement is important, too."

Robert Dupuy runs Robert Dupuy Consulting LLC, a lighting design firm also located in Portland. He serves on the IES Aged and Partially Sighted Lighting Committee, which is focused on best practices for lighting in eldercare facilities and senior living environments.

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EYES

By Jeff Gavin

Improved lighting design means brighter days for seniors

"Senior care residents often complain of light being too bright," he said. "You want to maintain even light level for easy adjustment for the eyes, factoring in how light needs to hit the eye and what kind of light. Electrical contractors can be that collaborator with residential aging-in-place clients and lead design team partners involved in senior housing. It does take some education to learn how light affects the aging population and the best ways to light for them."

Greg Guarnaccia, founder and principal lighting designer of Doubledge Design LLC, Baltimore, chairs the IES Aged and Partially Sighted Lighting Committee. His committee revised and reintroduced "Lighting Your Way to Better Vision." The revision keeps a residential aging-in-place focus and layperson overview on the basics of lighting, ranging from color temperature to lighting levels, lumens to reflected glare, and overall best practices for lighting design. Tactics including outdoor pathway lighting, needs from room to room, stairways, balancing light and use of controls are covered in some depth.

"In the last 10 years, the neuroscience of lighting and vision and its relation to biology has seen an incredible research push," Guarnaccia said. "It has reshaped this industry for many, including lighting designers. We are better understanding how LED technology and

the biological connect to lighting. Quality of light in the past typically meant color rendering and balance spectrum. Now it's health and how it's applied in the physical environment, as well."

Meeting the moment

Guarnaccia feels time may have caught up to "Lighting Your Way to Better Vision," as the interest of consumers, designers and others has grown. IES task groups focus heavily on education.

Dupuy finds education is the key to building greater awareness and adoption of better lighting for seniors.

"It's education for the consumer, developers and builders; contractors; and code officials," Dupuy said. "Did you know the protective film over your eyes yellows as you age and consequently filters out blue spectrum light? A project team might somewhat understand the lighting needs of seniors but needs more information, including successful lighting design. Resources from ANSI [American National Standards Institute]

and IES certainly help as they provide evidence-based design."

"Some consumers are becoming lighting savvy to a degree," Dupuy said. "It would be helpful if big box stores offered takeaway information that explained how LED lighting works and how it can

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be applied. You do see displays that are a good attempt at demonstrating the lighting differences of LED bulbs. However, there is still misrepresentation out there. In a store I visited, warm lighting was described using the wrong color temperature."

Education efforts are beginning to pay off, sometimes in big ways. For example, Guarnaccia shared how skilled nursing facilities in Florida are adopting lighting guidelines as laid out in the IES publication, "Lighting and the Visual Environment for Seniors and the Low Vision Population."

"Solid aging-in-place guidance is growing but we need to get beyond senior facilities that simply look nice to impress potential residents and their adult children," Noell-Waggoner explained. "Facilities must fully meet the physical needs of seniors and that includes appropriate lighting and lighting schemes."

Naomi J. Miller is a senior lighting research scientist for Pacific Northwest National Laboratory, Richland, Wash.

"Considering residents spend little time outdoors and are subjected to miserable levels of indoor lighting, good lighting and its merits can gain traction," Miller said.

The basics of good design

Designing lighting for seniors starts with bringing in as much natural daylight as possible. Building orientation, ample windows and maybe skylights can do a lot. For example, north-facing rooms allow for generally even, natural light and avoid summer heat.

"Balancing daylight is very important," Noell-Waggoner said. "Seniors' eyes take longer to adjust to lighting changes." She also advised that ambient illumination should be three to four times higher (30 foot-candles for general room lighting) than is typical for younger people. Light uniformity is also essential.

"Look for fixtures that spread their light against walls and ceilings," Miller said. "This will reduce glare and soften the light as it meets the eye, making it much more comfortable. Think white or pastel wall colors. It is also more energy-efficient. If you are going to use a dark color, use it as an accent. Dark colors are far less reflective when you are trying to distribute light."

Avoiding glare is another consideration for aging eyes.



"Older folks are much more sensitive to glare," Miller said. "So, no bright fixtures on the ceiling, no excessively bright windows. Controls that manage the light from various angles are good. Nonmechanicals might include designing windows with deeper overhangs or light shelves to capture and redirect light onto the ceiling, blinds or louvers. North-facing windows provide no glare. South-facing [windows] can be designed to minimize glare."

Table lighting, if used well, can be part of a lighting scheme for seniors. So can task lighting, including undercabinet illumination in a kitchen. Lighting installed on stairs will safely illuminate each step to reduce missteps and falls.

"Bathrooms also need special lighting care," Noell-Waggoner said. "This is critical for grooming and bathing."

For vanities, vertical lighting fixtures located on each side of the mirror illuminate both sides of the face, assisting in shaving, applying makeup and other needs. Night lighting is important as well. Amber light is less disruptive to the sleep phase. Occupancy sensors might also be a good fit for this space.

Closets are a consideration, too. Noell-Waggoner suggests lighting with a high color rendering index (CRI) that will not alter the color of clothing and help in distinguishing darker garments. A CRI of 80 or above is recommended. Again, occupancy sensors could be beneficial.

While LED lighting flicker has been greatly reduced, hum can persist notably in residential applications where LED light bulbs interact with dimmers. If the budget

allows, Guarnaccia suggests a high-grade residential control system.

The body clock

Good lighting for seniors should also support their circadian rhythm. When windows and skylights do not give enough natural daylight, artificial lighting systems such as daylighting or circadian are a possibility.

"I would try daylighting systems first, as they give you the best light spectrum at the right time of day," Miller said. "They will more evenly distribute desired light levels from that blend of natural and artificial light. We are still learning when it comes to circadian lighting systems."

Miller shared how tunable lighting systems were employed in two on-site senior lighting studies (2016 and 2019) at the ACC Care Center in Sacramento, Calif., which supports dementia patients.

"We thought the color change would do the magic. That was not enough. We needed to change light levels," she said.

The lesson learned was to make sure a circadian lighting system delivered on its advertised light levels.

"The tunable lighting was able to be turned down to 20%, allowing us to drop color level in the evening. Also, dropping light levels in the corridors gave us a nonintrusive buttery light. We liked these capabilities of the system."

In the follow-up 2019 study, circadian lighting was used to explore effects of lighting on sleep and resident agitation.

"There was a clear benefit to further turning down the lighting at night and eliminating the blue of the LED," he said.

Miller noted COVID-19 has brought a new focus to senior care facilities.

"We are learning more about senior physiology and how lighting can promote health [and] well-being. Now may be the perfect opportunity to introduce a discussion of healthy lighting, as well," she said.

A focus on healthy lighting and how it affects quality of life is applicable to all senior living environments.

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