



# Academy Journal

October 27, 2004 | Print this page | Email this page

## **Lighting Design for Healthcare Facilities: A Common-Sense Approach**

**Abstract** | **Article**

*This article has helpful hints for healthcare designers, administrators, and physicians interested in designing medical spaces pleasing to the users and to the accountants responsible for operating costs.*

*Healthcare facilities have many different types of spaces in them, each requiring their own approach to lighting. When conceptualizing the lighting, designers need to imagine they are the users of the facility. For patient areas, remember that patients' bodies are not functioning at 100 percent. Patients are uncomfortable, anxious, possibly upset, and would rather be anywhere but in the space being designed. Help them appreciate the experience by providing pleasant surroundings. In combination with other interior elements, properly designed lighting can help put people at ease and increase their sense of security. It can make the difference between subconsciously fighting the building design and aiding in diagnosis and recovery.*

*Integral to selecting the right fixtures and positioning them in the correct locations, incorporating lighting controls will also ensure proper illumination levels while simultaneously providing energy savings. Gone are the days of the switchplate stickers that said, "Please turn off the lights as you leave." Electronic-controls technology has advanced considerably in the last 10 years and has relatively short payback periods.*

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**Lighting and its powerful effect on specific medical applications have been studied through numerous technical analyses. This article takes a philosophical approach rather than a technical one. It is intended to be a basic design primer and argument for paying attention to lighting design in healthcare environments. It will also attempt to illustrate why budgeting more pennies up front may lead to dollars saved in utilities and user-appreciation programs.**

### **Lobby**

**Warm, open, inviting, easy to navigate—our clients use these adjectives to describe their desires for a lobby. The main lobby is also the place to pull out the stops to make a visual statement about the entire institution. Clients obviously want this visual statement to be impressive or, as the British say, "bang on." If at all possible, an abundance of natural light should constitute most of the daytime illumination in a lobby. Light may be only one layer of an interior element in a successful lobby, but it is perhaps the most important. People coming through the doors are sick, worried, frantic, happy, sad, aged, in a hurry, reluctant. Invite them in with natural light supplemented by glowing wall sconces that provide subtle decoration. Most visitors use the lobby during the day. At night it can be the place where overnight patients wander to get out of their rooms. Nighttime illumination should be softer and quieter while offering some glow and sparkle. Be sure to provide enough illumination to foster a sense of security for people who are still somewhat frail.**



Lobby space with abundant natural light<sup>1</sup>

### **Waiting Areas**

**To calm nerves and instill comfort, provide a variety of sources in waiting areas. Do not install only general illumination from the ceiling. Be sure to use table lamps**

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***and other accent lighting as well. In addition, a view to the outdoors would be preferable. Patients generally bring at least one other person with them. It is important to minimize facial shadows and distortion to foster normal conversation similar to what they would enjoy in their own living rooms. Warm color temperatures are very important in waiting areas.***



Pendant lighting at a nursing station helps to eliminate shadows on faces and functions as a wayfinding tool.<sup>2</sup>

### **Centralized Nursing Stations**

***Nursing stations are among the busiest, most-used areas in any hospital. They serve as meeting areas for staff and physicians, as offices, as break areas, as nutrition or medicine preparation areas, and as interaction points for nursing staff and public. This combination of uses requires a combination of light sources. Provide low-level, general illumination for maneuvering and maintaining personal space security when meeting with other staff. Focused task lighting will be needed where reading, writing, and dispensing occur. At the public-interface location, be sure there is proper***

***illumination for faces. If only overhead downlighting is provided, long shadows and unflattering distortion can occur on the face. Locations of public-to-staff interaction should also be of higher illumination because there is a less familiar relationship than between staff. Higher illumination at this point will also serve as a wayfinding tool for patients or the public that spotlights where to go for help or answers.***

### **Clinical Areas**

***A common theme throughout this article is the importance of designing lighting for the occupant and task, preferably around the patient experience. Nowhere is this more important than in***



Lighting in this clinical area is designed to enhance the patient experience.<sup>3</sup>

*clinical areas.*

***Consider the following situation: When visiting an ophthalmologist in a medical office building, a patient needed drops to dilate his eyes. The doctor and his assistant both had problems getting drops into the patient's eyes and became irritated with the patient.***

***They failed to realize that, as they administered the drops, the patient had to try to keep his eyes open without blinking while looking directly into the four-lamp, recessed fluorescent fixture glaring down over the patient chair. Once the patient realized what the problem was and asked the staff to turn off the overhead lights, the task became much easier! How can the author speak so clearly on this instance? He was the patient. What about those patients who do not know what to ask or even whether they are allowed to ask? Why should patients have to think about how to solve a problem with the building design when they should be concentrating on solving health issues in tandem with the health professionals? Consider how much calmer the patient and staff would have been if the lights had been positioned around the exterior of the room rather than over the chair. Even better, what if they were wall-mounted up and down lights? Another common solution to eye-care areas is to provide low-perimeter general illumination augmented with task lights where needed. In any case, be sure the lamps provide true color rendition in clinical areas.***

### ***Patient Rooms***

***Patient rooms must be lit in a way that is less clinical and more homelike. No news here--designers, hospital staff, and administrators typically spend a great deal of time on patient room design and often prepare a mock-up of the rooms to pretest the arrangement. Rarely, though, is lighting installed to test the full effect. Be sure to incorporate lamps into the design. Bring the lighting source out of the ceiling and down to a reachable, interactive level (sounds like task lighting!). Maintain a minimal ambient level for basic maneuvering and augment additional point sources where needed. Consider making the lighting repositionable, either from the wall or the floor for added user control.***

***Dimmable, indirect lighting usually functions best for patient-room general illumination. Allowing a glimpse of the light source (with some downlight component for, say,***

*an 80/20 mix) will enable even lower illumination levels because people perceive spaces as brighter when they can see the light source. Remember to account for natural daylight from the window. By installing a sheer drapery, the light will be diffused. In addition, installing a room-darkening drapery can help control intense sun for daytime sleeping or outdoor lighting at night.*

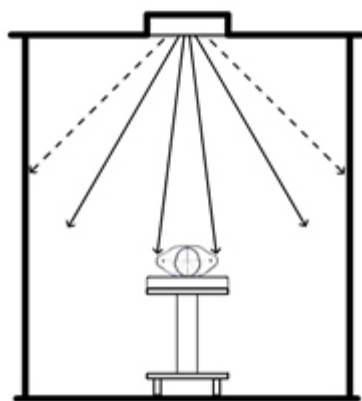
### **Restrooms**

*As at nursing stations, illumination of the face is very important here. Consider installing fixtures on the sides of mirrors rather than above them or in the ceiling. Picture the installation of light strips around mirrors in actors' dressing rooms. There is a practical reason for bringing the light down to this level: Shadows are eliminated and colors are truer. In addition to lighting the face, general illumination in toilet rooms enables patients and staff to maneuver safely.*

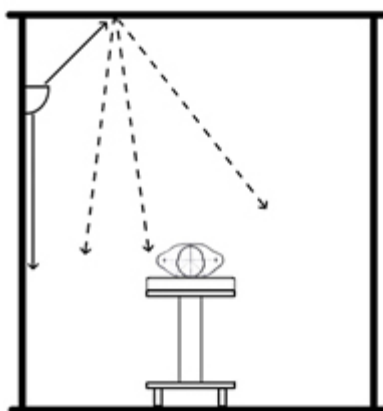
*These rooms are ideal locations for occupancy sensors; there would no longer be a need to fumble for the on-switch or forget to turn off the light. An EPA survey found that restrooms are the areas most lit when unoccupied. Think about the energy savings possible with occupancy sensors. This is especially true when you consider that medical buildings spend the largest amount of energy on powering interior lights (see electricity-usage graph, below).*

### **Corridors**

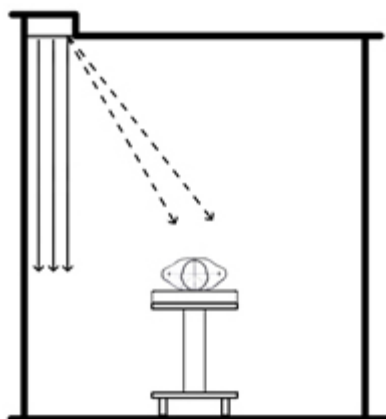
*Patient rooms and surgery suites are the most logical areas to consider--and the places where designers and administrators are most likely to devote their attention. However, do not neglect the areas connecting them: corridors. In the early stages of ADA development, the best way to educate designers to the plight of those in wheelchairs or without vision was to put the designers in wheelchairs and/or blindfold them. Applying a similar approach to healthcare lighting, designers should be wheeled on their backs on a gurney along a patient's journey through a hospital. Look at those ugly, boring ceilings. What about those bright lights shining down? The patient can feel trapped. The architecture suggests that one is in an institution. To put it in perspective, is this experience more like being at home or being in a prison?*



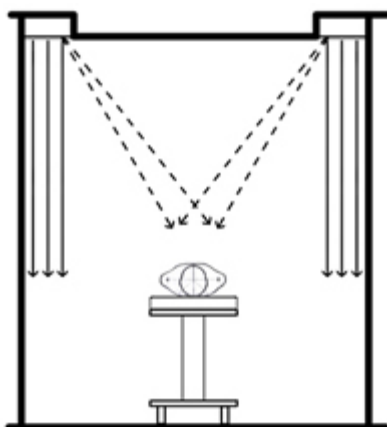
DownLighting from Center



Direct / Indirect from Side



DownLighting from Sides in  
Corridors 5' and Narrower



DownLighting from Two Sides in  
Corridors over 5'-Wide



Indirect lighting in a corridor is more soothing to a patient lying on a gurney.<sup>4</sup>

*Is all this light really needed, and is it needed where it is positioned? How easy it is for designers to get on the computer, insert a grid for the ceiling plan, and center 2 x 4 fixtures down a corridor on 10- or 12-foot centers. A better suggestion would be to light them like clinical areas--with*

*perimeter lighting. This may even work out better for all systems because many medical corridors are replete with mechanical ducts and piping down the center. Claim the perimeter as the zone for light fixtures, and relegate the rest to other disciplines.*

*Natural light can be quite nice in corridors, especially if coming from windows lower than 7 feet high. Again, recall that patients may be lying on their backs, looking upward. Clerestory windows, transom windows, or (worst of all) skylights may throw beautiful light on the floor for staff to enjoy, but overhead light sources are disturbing for patients on their backs.*

#### **Offices**

*A common practice in many offices is to illuminate the entire room for the amount of foot-candles (fc) needed at the work surface. To install indirect fixtures that bounce light off the ceiling to reduce glare on computer screens, you would need about 70fc at the ceiling to produce about 50fc on the desk. Why not reduce the ambient lighting to 25fc and provide a task light at the work surface that can produce 50fc to 100fc? Better yet, organize offices so that natural light penetrates deep into the space. Put private offices toward the core, and open office spaces toward the*

*windows. Private offices are still a privilege, but in this way everyone can share the sun--and energy savings. Be sure that artificial lighting in offices arranged this way is positioned parallel to the windows and switched so that rows closest to the windows can be turned off during the day. Controls technology will also allow automatic, imperceptible dimming of lights based on the amount of solar light in a space. A small initial investment will be working to save energy (= money) every minute of every day!*

#### **Storage, Back of House**

*These are also ideal candidates for occupancy sensors. The size of the space and the actual usage will dictate type of fixtures, spacing, lamps, and controls.*

#### **Chapels and Meditation Rooms**

*There are as many ways to light these areas as there are denominations. A layering of different systems will help to produce a sophisticated scheme. General recommendations are to install very low perimeter illumination that cannot be switched off by the public. This functions as baseline security. Next, provide options for user-regulated light based on the use and mood of the occupants. Some focused light may be used to highlight art or special features. Warm-tone light is especially appreciated in chapels and meditation rooms. Natural light with a controlled view to the exterior helps people recall nature, the world outside, the divine, and the order of all of these.*

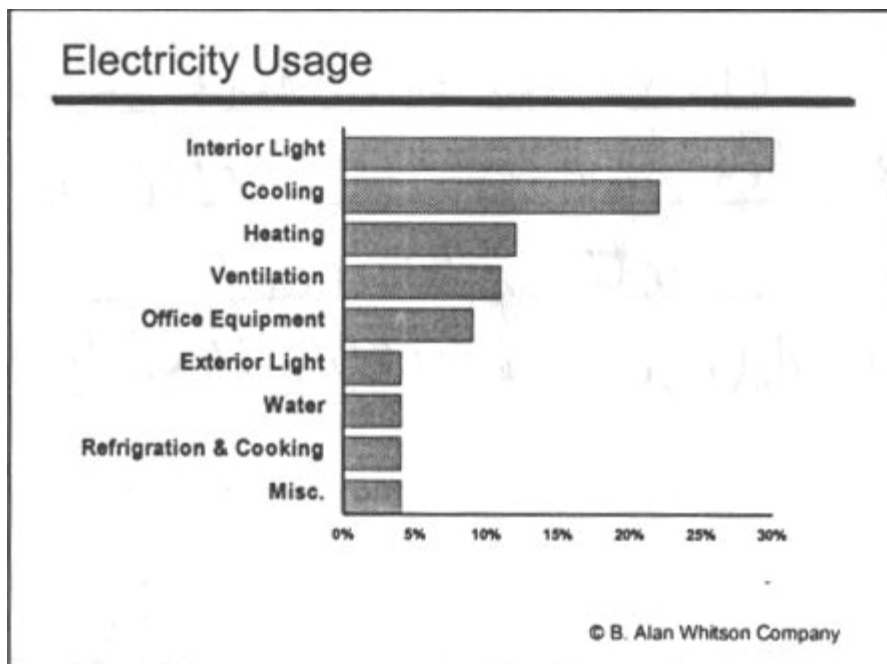
#### **Gift Shop**

*Think retail. From a design perspective, shadows and highlights are important here; general illumination is not. Because hospital gift shops are generally small, the light spill from spotlighting should provide adequate general illumination. Gift shops are generally staffed by volunteers. Be sure the lamps have a long life. The last thing a hospital administrator wants to observe is an elderly volunteer, standing on a chair, trying to change a lamp. Try metal halide track fixtures. They have long life, are adjustable, provide good illumination and color balance, and do not consume as much energy as incandescent. Because most retail lighting options generate a great deal of heat, be sure the HVAC system is sized accordingly.*

#### **The Logic of It All**

*Interior lighting accounts for 30 percent of a medical facility's electricity usage, and 75 percent of healthcare floor space is illuminated 100 percent of the time. So why light an empty room?*

*Considering, too, that 80 percent of a fluorescent lamp's energy is converted to heat and only 20 percent of it to light, turning off unused fixtures will also reduce the cooling load. Why light--and pay for--extra illumination throughout the entire space? Not only does the CFO feel the strain, but everyone's eye muscles are paying for it as well.*



*Does this mean we should throw out the lights? No, of course not. Artificial lighting allows us to use interior spaces that lack sufficient natural lighting during the day and allows us to use all spaces at night. When designing lighting, keep in mind that people are more secure during the day (light) in a strange place than at night (dark). Be sure to balance the general illumination level between too dark and too light and to incorporate proper lighting controls.*

#### **Bright Ideas**

**1. The most common way to reduce energy consumption is to replace older fixtures.**

- **Change from magnetic to electronic ballasts.**
- **Change from T-12 lamps to T-8 or T-5.**
- **Install fixtures with better reflectance (aluminum reflectors) to maximize the light output and distribution.**
- **Carefully select lenses.**

**2. Design recommendations:**

- **Increase fixture spacing.**
- **Specify the most efficient lamp/ballast combination.**
- **Illuminate task areas higher and nontask areas lower.**
- **Look at the furniture and fixtures plan to begin considering how the room might be used and by whom.**

**3. Take tips from hospitality design.**

- **Areas must glow, not glare.**
- **Add sparkle in highlight areas to draw attention.**

**4. Don't forget to design the ceiling!**

- **Other than the restroom and the upper portion of the**



*walls, the ceiling is the part of the building that most patients see when they are sickest and the weakest. Give ceilings an organized and attractive appearance.*

- *Generally MRI rooms have specially designed ceiling areas, based on the knowledge that patients are on their backs and anxious.*
- *Remember to control the HVAC grille locations and selections. The mechanical engineer's job is to make spaces feel good, not look good.*

**5. Use automatic controls to dim or turn off fixtures when not needed.**

*While healthcare facilities present a design challenge because of the variety of spatial uses, a successful lighting design that includes well-thought-out fixture selection, fixture placement, and lighting controls will be a significant factor toward ensuring a happy staff, comfortable patients, and minimal energy costs.*

#### **Footnotes**

<sup>1</sup> *Anschutz Outpatient Pavilion, University of Colorado Hospital, Aurora, Colo.; HDR Architecture Inc.*

<sup>2</sup> *Promedica Bay Park Community Hospital, Toledo; NBBJ. Photograph by Paul Warchol.*

<sup>3</sup> *Windsor Regional Cancer Centre, Windsor, Ontario; Vermeulen/Hind Architects, Dundas, Ontario. Photograph by Ben Rahn, A Frame Studios.*

<sup>4</sup> *Saint Alphonsus Regional Medical Center, Boise Idaho; HDR Architecture Inc.*

<sup>5</sup> *Alan Whitson, RPA; B. Alan Whitson Company, Newport Beach, Calif.*

*The Academy Journal* is published by the AIA Academy of Architecture for Health (AAH). The Journal is the official publication of the AAH and explores subjects of interest to AIA-AAH members and to others involved in the fields of healthcare architecture, planning, design and construction. [www.aia.org/aah](http://www.aia.org/aah)

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