



Designing Door Treatments for Improved Patient Outcomes in Hospitals

How doors with vision, noise and light control solutions can impact patient recovery and well-being

By Viviane Chan

Hospital design and architecture can play an important role in a patient's recovery and well-being. A number of studies have examined how hospital design and architecture affect patients and healthcare workers, and the results make a compelling case for patient-centered design. This means that doors aren't just doors anymore—they need to be more than just entrance portals or barriers. Doors are increasingly being considered as part of an optimal patient recovery environment.

Doors should help reduce noise

Recent studies of U.S. hospitals have shown that the average ICU patient is exposed to background noise that is *eight times louder* than the guidelines set out by the World Health Organization. This increased noise level has a wide range of effects on patients and healthcare professionals.

In addition to the obvious difficulty in sleeping, patients exposed to higher levels of noise consistently show

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higher levels of stress, increased heart and respiratory rates, higher blood pressure and even decreased levels of oxygen saturation in infants¹. These can all decrease the body's ability to recover and heal, and leads to longer hospital stays, along with higher rates of re-hospitalization².

Similarly, healthcare workers have been shown to endure higher levels of stress and anxiety due to noise, which also creates workplace issues. Nurses and doctors often experience decreased productivity and a higher incidence of error with patients. The increased stress has also been linked to the 20 percent turnover rate among nurses in U.S. hospitals³. Doors and windows with sound attenuating characteristics can help create more tranquil healing spaces.

Doors should reinforce privacy

Much like increased levels of noise, a lack of patient privacy has adverse effects on recovery times and patient outcomes. Hospital stays are often a time of weakness and vulnerability for patients, and the ability to recover in private is important.

In addition to the heightened levels of stress, a lack of privacy has been proven to interfere with treatment. Patients have admitted to withholding aspects of their medical history or refusing physical examinations when they have concerns regarding their privacy⁴. Additionally, more than 82 percent of U.S. nurses surveyed strongly preferred collecting patient information and performing examinations in private rooms or areas with increased privacy⁵.

Hospitals tend to favor doors with glazing to ensure visibility for healthcare staff, making it important to incorporate vision control options for patient privacy.

Doors should control light

The positive impacts of natural light on human dispositions are well documented. In healthcare environments, there is much evidence to support the healing benefits of controlled sunlight

for patients. While natural light has positive benefits for patients, bright artificial lights can be a deterrent to healing. Patients need rest to bolster healing, and bright lights seeping in from corridors, nursing stations and other adjacent rooms can significantly impact a patient's rest. Any interior glazing should therefore have light blocking capabilities.

Doors should support optimal hygiene

Creating more sterile environments is of critical importance for patient outcomes. Building materials need

to encompass the most optimally hygienic finishes. In isolation rooms or ICUs, the minimization of horizontal surfaces that collect dust is absolutely critical. Dust contaminated by infectious agents can build up as a reservoir that can cause an outbreak of infection, even after the infectious patient has left. Any privacy or vision control solutions for doors and glazing should eliminate or mitigate bacteria.

Doors need to consider maintenance and power requirements

Architects have many operational requirements to consider when



Sacred Heart Hospital, Pensacola, Fla. More than 70 integrated louver units were used in interiors doors and 160 in sliding doors to afford ensure a tranquil healing environment and acoustic privacy.



Memorial Hospital, South Bend, Ind, is not only recognized nationally as a leader in providing high quality care, but also as a leader in innovation, offering new approaches to patient satisfaction. Memorial employed more than 30 doors with integrated louvers in patient areas to ensure flexible privacy.

Photos courtesy of Unicel Architectural

designing healthcare facilities. Solutions need to meet the privacy, safety and infection prevention standards without adding significantly to operating costs. Any door design solution that requires undue maintenance processes or power usage can be a burden on healthcare budgets.

Hospitals also typically have strict emergency requirements that seek to limit power consumption. In the event

of a power outage, patient privacy, heat and sound control solutions must be able to operate without draining precious power that is needed for more essential functions.

Design solutions for door treatments

To ensure patient safety and the best possible outcomes, hospital designers must find a way to employ interior

door and glazing solutions (including borrowed lites and windows) that provide patients with privacy and noise reduction without removing the visibility nurses and doctors need to properly care for them. They also need to consider heat and light control, ongoing maintenance requirements and hygiene.

There are a number of solutions available ranging from very basic

curtains to more advanced smart glass solutions.

- **Curtains** that cover glazing in doors can provide basic visual privacy and provide a low cost solution for vision control. However, curtains are easily the dirtiest surface in a patient room. They gather dust and dirt, are difficult to clean and are therefore rarely sanitized. They do not provide the required adjustable levels of visibility. They will block light, but will not allow for flexible light or vision control management.
 - **Blinds** that are attached to glazing on doors offer adjustable levels of vision control at a lower cost, but accumulate dirt and dust, making them unhygienic and difficult to maintain. They also have holes and gaps, which render them ineffective for those instances when complete privacy or darkening is a must. Even when fully closed, blinds will still have gaps between the slats that prevent complete privacy or light blockage. They offer no sound control, and they provide only moderate light control.
 - **Venetian blinds between glass** that are installed within doors are more hygienic than just blinds, but are prone to damage. Exterior cords frequently lead to entanglement and other maintenance issues. They can also get easily misaligned leaving visual gaps. Even when fully closed, the spacing between slats does not offer complete privacy and light blockage. They are not known for long-term durability.
 - **Frosted or sandblasted glass**, which slides up and down to mimic the lines of blinds, offers only a partial solution. Visibility can be hindered with limited capacity for adjustment. Frosted glass only offers a maximum of 50 percent visibility.
- When healthcare workers need to view into patient rooms for monitoring purposes, patient privacy will be impeded by the two-way visibility. The translucent lines do



Indiana University Health North Hospital is a full-service hospital for adults and children. More than 100 integrated louver units were employed in interior doors to better control vision, light and sound.

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not fully block light from bright hospital lights which can significantly inhibit a patient's rest. Additionally, mechanical levers can be hard to operate as the mechanism carries the full weight of the glass being lifted.

➤ **Liquid crystal glass** solutions can provide instant privacy with the click of a button. They can also easily infringe on patient privacy when the switch is turned on to reveal clear glass. These solutions don't provide adjustable levels of seclusion, and are impractical as their on-or-off-only options do not permit discreet observation of patients by medical staff. Their default position is opaque, which means that in case of power outages they will require valuable emergency power sources to provide visibility into patient areas. They are more expensive to install, operate and maintain, and offer no real light control.

➤ **Smart glass**, magic glass, or switchable glass refers to electrically switchable glass or glazing which changes light transmission properties when voltage is applied. Smart glass is a less than ideal solution for hospitals in terms of installation costs, increases in electrical use and long-term functionality issues. It is also very limited in terms of quick control, and does not offer complete privacy—only a darkening of the glass.

➤ **Integrated louvers**—insulating glass units with integrated cord-free louvers—offer completely adjustable vision control. When fully opened, they provide 80 percent visibility. When fully closed they ensure 100 percent vision blocking. They can be angled to provide discreet observation by healthcare personnel, while preventing patients from feeling observed and exposed.

They typically feature double glazing with a two-inch airspace that has a Sound Transmission

Class (STC) rating on par with drywall and concrete block walls. As they are hermetically sealed with a contaminant proof seal, they ensure maximum levels of hygiene. Further, integrated louvers don't require power for operation. ■



VIVIANE CHAN is the head of business development for Unicel Architectural. A long-time building industry professional, Chan has worked with architectural firms around the world to deliver on quality vision and daylight control solutions for leading design projects, particularly in the healthcare sector. She is the co-author of an industry newsletter, *Reflections*, and has authored an accredited AIA course on daylighting design techniques. Viviane is a frequent contributor to architectural and building products magazines. She can be reached at vchan@unicelarchitectural.com

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