



Today's hospitals
must be designed
with the **worst-case**
scenario in mind.

SAFE & SOUND

BY DAVID WHITEMYER

PHOTOGRAPHY BY GREGOR SCHUSTER/GETTY IMAGES



Plans are underway to construct an emergency power generator plant above flood level at Cape Fear Valley Health System in Fayetteville, N.C. And the Henry Mayo Newhall Memorial Hospital in Valencia, Calif., recently purchased two portable surgery tents that inflate in minutes and can house dozens of patients.

“The idea of hospital preparedness is not new,” says Wayne Ruga, Ph.D., FIIDA, AIA, Hon. FASID, Founder and President of the Center for Health Design. He cites the military as an organization that has hundreds of facilities geared up for large disasters. “They always had this subject as part of their [project] requirements. They’re geared up for disaster.”

But today, healthcare designers are stepping up to the plate, lending their expertise to ready hospitals

for the possibility of a large-scale disaster. And in the spate of recent frightening events – from Hurricane Katrina and the Indian Ocean tsunami to terrorist attacks around the globe and fears of an avian influenza pandemic – hospitals everywhere are looking to improve their amenities in preparation for a worst-case scenario.

Floodwaters from a barrage of 2005 storms have shown healthcare planners the importance of providing backup power systems. The likelihood of a major disease outbreak or bioterrorist attack has forced engineers to consider how to seal off a building and how to deal with mass quarantine and decontamination.

“This is a design challenge,” says Linda Gabel, IIDA, AAHID, Senior Associate at NBBJ, Columbus, Ohio, and IIDA’s Healthcare Forum Advisor. “How do we deal with lighting and acoustics, color and texture? How do we plan for [disastrous] events while making spaces that are conducive

to a healing environment?”

Healthcare design, in some part, already takes into account “what if” scenarios. Interior designers know the importance of durable, seamless wall and flooring systems, where contagions cannot sneak into cracks and crevices. Gabel cites examples of operating rooms and emergency departments whose finishes are easy to clean, and trauma bays that can be quickly hosed down. In addition, manufacturers of healthcare architectural products and materials are being challenged to give designers more options that don’t look so institutional.

I’LL HUFF AND I’LL PUFF

When it comes to the design needs for large-scale disaster preparedness, “interior designers do more than pick finishes and lay out furnishings,” Gabel says. “Many interior designers now do medical planning and master planning with their clients.”

Most hospitals have disaster plans in place. But it is the designer’s job to learn



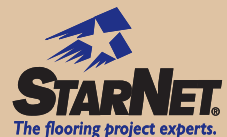
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those plans and to accommodate for them spatially.

Important to any hospital and its disaster plan implementation is to ensure the building remains open and useable during major emergencies. Some organizations have even turned this to policy. For example, the state of California views hospitals as essential community services, so in 1973, the state legislature passed the Alfred E. Alquist Hospital Seismic Safety Act, pledging that hospitals would be “reasonably capable” of providing acute care after a disaster. The state updated the act in 1994 to require even more stringent preparedness measures.

More recently, in 2002, the Washington, D.C.-based Veteran Health Administration updated its requirement that the Department of Veteran Affairs medical facilities be capable of staying in operation during national security emergencies, war, and natural and manmade disasters.

The need for disaster preparedness became

particularly apparent in 2004, when hurricanes Charley, Frances, Gene and Ivan damaged 98 Florida hospitals and caused approximately 630 patients to be evacuated. In this respect, Parsons Meta, an engineering and program management firm, has seen increased business in the spirit of preparedness.

“We are currently designing several hospitals in the Southeast United States in which the facilities have undergone extensive structural and architectural scrutiny to ensure they are hurricane-proof,” says Karen C. Ellis, Vice President of Interior Design in the healthcare sector of Parsons in Louisville, Ky. “We look at structural elements, exterior building materials and planning that places critical services within the interior protection of the building”

Parsons also is working with healthcare systems to receive portable generators and station them across the Southeast. Having backup electricity distribution is essential to keeping a hospital in operation. When an

earthquake, for example, takes out city power, hospital life-support equipment and HVAC systems must continue to work.

But even redundant mechanical and electrical systems may not be enough. Whenever possible, independent water and air intake systems help a hospital to be a self-supporting building.

AT A MOMENT'S NOTICE

Healthcare spaces must be extremely flexible, given the wide range of possible conditions, including natural disasters, terrorism and biological outbreaks. Whatever a facility's emergency drills, and regardless of a building's ability to support itself, a hospital needs to plan for major flexibility and adaptability at a moment's notice.

Much of what is being learned about flexibility is being spearheaded by a federally funded project called ER One. Based at the MedStar Health/Washington Hospital Center, two miles from Capitol Hill in Washington, D.C., ER

One aims to “develop an ‘all-risks-ready’ emergency department, one designed with special capabilities built-in to manage the medical consequences of terrorism, disasters and epidemics,” according to its mission statement. It will become a prototype for emergency departments built in the United States and elsewhere.

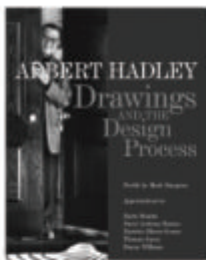
The flexibility worked into ER One includes easily moveable life-support

equipment and emergency rooms that can be accessed from multiple portals sealed off from main pathways. Rooms have negative-pressure air-handling systems so that contaminants are not re-circulated through the hospital. ER One is prepared to handle its normal daily flow of patients and a potential surge of thousands.

Frank Zilm, FAIA, President of Frank Zilm &

Associates, a healthcare facility planning firm based in Kansas City, Mo., cites ER One as the best example in planning for flexibility. “Just by adding 40 percent of space to a typical emergency room, capacity can be quadrupled during a surge,” he says.

Zilm, with more than 30 years’ experience in the programming and designing of health facilities, has written



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extensively about disaster preparation. In the projects he works on, flexibility and surge control are key.

“We’re looking at emergency vehicle traffic patterns and multiple access routes into emergency departments. We’re looking at corridor space as surge space, and at pushing triage outside of the hospital,” he says. “These aren’t radically expensive adaptations.”

Many new hospitals are considering pushing functions to the exterior. Parking garages are being constructed with flat surfaces, rather than sloped, so they can be used as triage areas. Landscaping techniques are creating large areas to set up mobile surgical tents. Exterior walls are being built with the infrastructure for communication, power and life-support gases.

Perhaps the best statement about the need for spatial flexibility in healthcare comes from a list of design guidelines written by Zilm, where designers must “anticipate

that key strategic assumptions will turn out to be wrong ... the emergency department should be able to grow, change and adapt.”

LEADING THE WAY

On the surface of all this “what if” planning, designers must remember that hospitals are for healing and should be created as such – welcoming, comforting and efficient environments.

Designers are trained to be leaders, Ruga says, and should be guiding conversations with their clients about technical preparedness issues without ever losing sight of the goal of improving total healthcare.

“The design of the healthcare environment makes a big difference,” he says. “I want to see designers better prepared. The thing that is missing [in healthcare design] is the subject of leadership.”

Home Is Where the Cot Is

As Hurricane Katrina bore down on the U.S. Gulf Coast, about 10,000 New Orleans residents sought protection in the Superdome, a multi-purpose sports and exposition arena. The number of people rose to about 15,000 in the days that followed.

It was a mess, with inadequate toilet facilities, poor air quality, no water-purification system and a major lack of cots.

When disaster strikes and drives people out of their homes, they have to go somewhere. “People assume that a hospital is the safest place to go during a disaster,” says Linda Gabel, IIDA’s Healthcare Forum Advisor. But that’s not always possible. Of the 15 hospitals in the New Orleans area, only three remained open after Katrina.

Even then, healthcare facilities aren’t prepared to house a surge of thousands. “Many hospitals are now looking into creating partnerships with area hotels and schools, as potential satellite hospitals,” Gabel says.

Though it’s rarely in the project program or budget — nor a client request — designers must at least entertain the possibility that certain buildings they create may someday be temporary homes to thousands of people. Building types in this scenario may include:

- School gymnasiums and cafeterias
- Community centers and meeting halls
- Warehouses
- Hotels and convention facilities
- Airports.

Not surprisingly, these are mostly constructs created and coded for large assemblies. Design considerations may include flexible space; storage for bedding, food and health apparatus; redundant energy systems; and oversized restrooms.

As was made apparent when the Denver, Colo., International Airport was a temporary home to about 4,000 stranded passengers during the December 2006 blizzard, a building can become a small city at a moment’s notice. Designers must do the best they can to accommodate that likelihood.

Adapted as an exercise by Suzanne M. Heath, Senior Director, Education and Professional Development

exercise:

- 1) Which states have been proactive in initiating policy regarding hospital preparedness during an emergency?
- 2) Briefly describe the Alfred E. Alquist Hospital Seismic Safety Act.
- 3) Which hospital mentioned in this article is seen as being the most prepared, and why?
- 4) Give four examples of different facilities that can be used for emergency care during a disaster.
- 5) Give an example of when and where this was put to use.
- 6) Give examples of how hospitals are pushing solutions to the exterior.

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