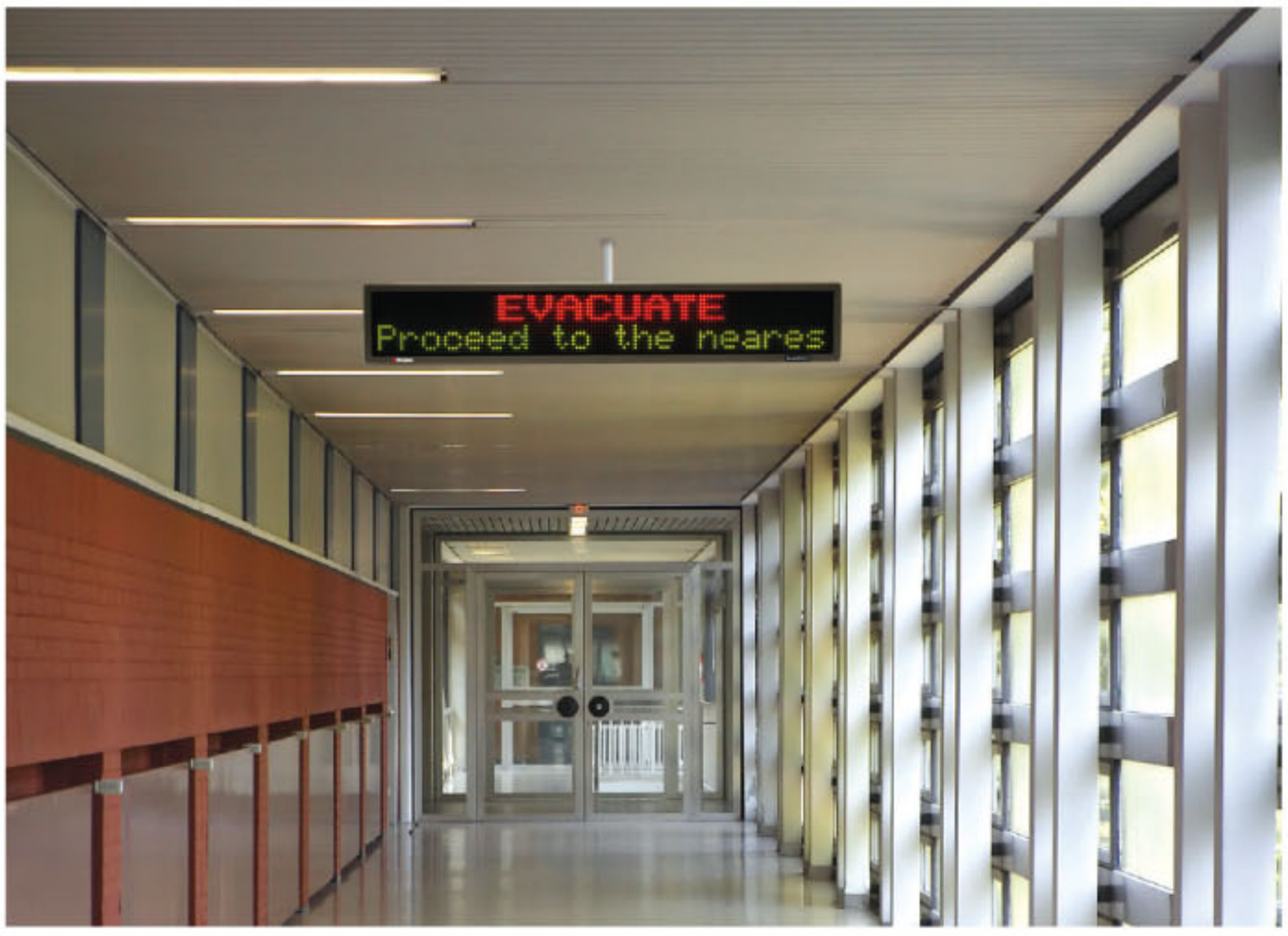
Mass notification system planning

Designing infrastructure to handle any emergency

Today's potential crises and disasters require the ability to customize a message and communicate to the building or campus occupants in real time. The large number of hospital visitors who are not familiar with the building's layout, egress path and evacuation procedures makes an effective communication system especially important.

Fortunately, technology enables the delivery of specific life-safety messages in real time to targeted groups of people through multiple channels. These include live or prerecorded voice announcements over indoor paging systems and outdoor speaker arrays, text messaging, email blasts, pop-up messages on employee workstations and digital textual message signs. When used properly, such features are effective at notifying the building occupants of a wide variety of emergency situations.

But putting such a system together requires a well-considered plan.



Panels with scrolling text can provide detailed instructions during an emergency event.

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Gathering input

In the early planning stages of designing a mass notification system (MNS), many parties should be consulted.

Because the International Building Code (IBC) or local state fire codes may specify different requirements for fire suppression, evacuation and personnel notification according to occupancy type, the building's architect should be consulted to validate whether the facility-use group classification is Group I-1 or Group I-2.

The fire protection engineer, who designed and manages the fire suppression sprinkler system, should be involved to ensure its effective interface with the MNS. Information technology department input is necessary if the MNS control panels are to be remotely accessed and monitored.

Information also should be gathered from hospital personnel whose actions are key during a crisis situation. This includes the chief of security and the head of nursing. The facilities staff also should be involved because they will be responsible for maintaining the MNS. Finally, the insurance provider and code officials (including representatives from the Joint Commission) should be involved in the planning process during the early stages.

It's essential to consult all applicable code requirements, including those of the IBC, National Fire Protection Association (NFPA) and Joint Commission. Federal, state and local codes should be reviewed to examine regulations according to the building's occupancy type and occupancy load. Code provisions may specify requirements for relocation plans, partial evaluation plans and egress paths.

Other provisions may regulate the criteria that determine signal priority or when one alarm system overrides another. This would apply, for example, if a fire alarm manual pull station is activated in a malicious attempt to evacuate the building. In this situation, a live voice message could override the evacuation message if there's a dangerous situation or event occurring outside the building.

Additional standards to consult during planning include the UL 2572, Standard for Mass Notification Systems, and ratings that apply to the system's audibility and intelligibility requirements when communicating a voice message (e.g., speech transmission index and common intelligibility scale ratings).

While audibility is the primary concern for older, tone-only systems, intelligibility, or the message's ability to be understood, becomes equally important for today's voice messaging systems. Finally, consideration should be given to whether the MNS will be monitored locally or via an off-site central monitoring service. In addition, it needs to be determined what access authorities will have, such as the ability to monitor the status of the system.

Analyzing interfaces

The MNS must be designed to integrate with other building systems to maximize efficiency and effectiveness. The following systems should be taken into consideration:

Electrical system. Electrical circuits

Maintaining a mass notification system

The National Fire Protection Association's NFPA 72, National Fire Alarm and Signaling Code, sets forth a maintenance schedule for mass notification systems (MNSs). As a reminder device, control panel alerts can be instituted to prompt maintenance personnel to schedule and institute required testing events. This is a feature offered by many new systems.

All new employees should receive MNS training. Administrators and nurses, for example, need to know how to initiate messages on the system, and all employees need to know how to respond and proceed when a message is communicated. It is also good practice to schedule refresher training for employees on a regular basis, along with practice drills as required by NFPA 72.

Vendors usually offer the option of a service contract, which provides regularly scheduled maintenance visits and troubleshooting when a problem arises. At intervals required by NFPA 72, the batteries also may need to be replaced during these visits. If there is ground interference or a break in the circuit, the vendor can restore the system. It's also good practice for the hospital's maintenance staff to have spare parts on hand. In particular, field devices such as speakers and strobe lights are useful to stock, so that maintenance staff can replace them as needed without delay. ■

must be code-compliant and powered from a lockable breaker to avoid accidental shutdown of the MNS. Also, circuits powering the MNS should be designed and installed so the control and operation of notification appliances outside of a particular evacuation zone will continue to operate if a fire or other event disables the system within that zone.

Building management systems. HVAC systems, including those that regulate airflow and exhaust, must interface with the MNS. For example, if a smoke bomb or other type of event creates smoke near the air intakes on the outside of the building, the HVAC units should receive signals from the system to respond and shut off so that smoke is not distributed throughout the building.

Access control and intrusion detection systems. These systems must communicate with the MNS to allow for free movement of the occupants to shelter areas or egress from the building during an alarm. In such situations, electronic lock power needs to be interrupted to allow people to move to safe areas of the building.

Video surveillance system. The video surveillance system may need to interface with the MNS in the case of an active shooter on-site. The cameras can aid hospital personnel in assessing the situation and determining where the threat is and where people should be directed to go.

Fire suppression system. Upon a fire suppression system activation, the MNS will direct relocation and/or evacuation away from the hazard.

Fire alarm system. The fire alarm system can be part of the MNS or a separate system. If separate, its components (e.g., pull stations and detectors) must operate in coordination with the MNS and the proper overrides should be in place to take precedence.

Phone system. The phone system must be operational during an event that triggers the MNS. Phones may be used to broadcast messages via the MNS and dial out to a central monitoring system.

Nurse call system. This will interface with the MNS when an event affects only one wing of a hospital. The call system can be used to notify nurses in another wing to lock down their wing for safety.

Building and campus data network. By designing the MNS to interface with the facilities data network, personnel can monitor the MNS remotely from their homes, other locations or while walking throughout the facility via tablet or other mobile device.

Determining features

MNS features vary by vendor. The hospital can make selections according to the specific needs of the facility and staff. Options may include:

Multitone alarm with voice messaging. This basic feature allows for a tone followed by a custom or prerecorded voice message. While fire audible alarm appliances are required by code to emit a temporal three-signal code, there is flexibility over which tones can be used by an MNS and the voice instructions that follow.

Strobe lights. Colored strobes provide visual notification and can indicate different types of events. The Americans with Disabilities Act specifies that a clear strobe should indicate fire and evacuation while an amber strobe indicates a different event and instruction, such as a shelter-in-place situation. Special care should be taken while selecting a notification appliance to broadcast both evacuation and other mass notification types of events.

Textual message boards. Light-emitting diode panels with scrolling text, digital display monitors or computer screens can provide more detailed information and instructions about the action to take and where to go during an emergency event.

Text messaging and email. Used primarily to communicate with hospital personnel, text messaging and email allow for push notifications. Employees enroll in the system by providing their phone numbers and email addresses. Another option is for pop-up messages to appear on computer desktops of hospital employees. Many types of computer notification systems even allow users to quickly report the conditions around them and notify the facility administrators that they're safe.

Graphical terminals and graphical maps. These features would be accessed on the computers of security personnel to enable them to monitor the crisis situation so they can openly communicate with emergency responding personnel.

Redundant communications. For multipanel systems in large campus environments (e.g., if there are MNS control panels in several building wings), each panel should be connected to more than one other panel. This should be formatted in a redundant loop, so that if one panel is disabled, the other panels in the campus or building remain operable and in communication with each other.

Outdoor notification. This enables the broadcasting of live or prerecorded voice messages campuswide through outdoor loudspeakers. Typical notification systems are limited to the interior of a building, but the option of notifying people

who may be approaching an unsafe building or area should be considered.

Networking or multibuilding systems. This enables MNS systems in separate buildings to coordinate with each other. After the design is completed, the installation process should begin with all stakeholders reviewing the vendor's submission to ensure compliance with the engineering documents. The request for information (RFI) process, which can take place prior to submission and during installation, should require the contractor to formally submit RFIs in writing and filter them through appropriate channels so that the engineering team can provide direction.

The contractor installing the system should be certified through the National Institute for Certification in Engineering Technologies. Unit pricing should be clearly spelled out up front for the owner with the cost of each system component identified to avoid large change orders when a replacement part is needed or if there are add-ons, moves or changes during the installation phase.

Installation can take place in phases, with coordination between hospital departments, to avoid interruption in the delivery of health care services. Staff may need to be relocated temporarily while installation takes place in their area. Another way to minimize disruption of daily hospital activities is to work in the evening and overnight during the second or third shift, when the number of visitors is reduced and outpatients are not present.

An engineer should inspect the complete installation of the system and identify any punch list items the contractor needs to address before ceiling tile is reinstalled.

Testing required by Chapter 10 of the NFPA's National Fire Alarm and Signaling Code (NFPA 72) takes place after installation is complete. These tests confirm correct operation of a range of system functions and components, including control unit inputs and outputs, battery capacity, system wiring, transmission equipment, initiating devices, notification appliances and emergency-communications equipment.

Several parties will need to be present during testing or have access to test reports, including the system's engineer, authority having jurisdiction, insurance carrier and the Joint Commission. Prior to the acceptance testing, equipment should be field-tested using calibrated testing equipment to verify that the intelligibility of voice messages in all areas of the hospital meet the level noted in specifications.

After testing, when the new system is operational, existing equipment can be decommissioned and demolished. When the system vendor completes as-built drawings of the new system, the engineer will convert them to an appropriate drawing format (e.g., 2-D, computer-aided design plans or a 3-D model) and return them to the building owner for use during future expansions or renovations.

The right message

A system that can effectively deliver the right emergency message saves time and confusion for staff, patients, visitors and first responders. HFM

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