The following articles are from 2012 issues of *Joint Commission Online*, which are no longer available on the website:

- Storage of freestanding medical gas cylinders: compliance and safety tips
- Piped medical gas: compliance and safety tips
- Tips for documenting fire response testing
- Tips for ensuring corridor-related compliance
- Managing corridor clutter
- Tips for maintaining fire and smoke barrier integrity

**Storage of freestanding medical gas cylinders: compliance and safety tips**

This article provides compliance and safety tips for freestanding medical gas cylinders. The last issue of *Joint Commission Online* covered piped medical gas systems. It may be impractical for some organizations to have piped nonflammable medical gases, so they may provide these gases in freestanding cylinders of various sizes. All freestanding cylinders must be stored in a rack, a cart, or another enclosure to protect them. Unsecured cylinders could fall, breaking the valve and possibly resulting in a rapid release of the gas, propelling the cylinder and turning it into a dangerous projectile. These tips are applicable to ambulatory care, critical access hospital, hospital, long term care, and Medicare/Medicaid certification-based long term care organizations.

- **Storing cylinders in the means of egress:** NFPA 99-1999 does not specify how many cylinders can be stored in the means of egress. However, NFPA 99-2005 allows up to 300 cubic feet (cu. ft.) of oxygen in containers per smoke compartment to be in the means of egress without being stored in a cabinet or room (out in the open). This means, for example, that up to 12 size E cylinders (which contain approximately 24.96 cu. ft. of oxygen) can be in an alcove in a means of egress without being protected in a cabinet or room. Limiting the amount of gas open to the means of egress to 300 cu. ft. allows the building air-handling equipment to stabilize the environment. If the volume of gases exceeds the allowable limits, it might create an oxygen-enriched area, which could be a hazard. The volume calculation does not include opened or used cylinders (as they no longer emit gas once opened), nor does it include cylinders currently in use.

Here are two examples of acceptable storage in the means of egress: an operating suite is lined with 15 gurneys, each with an E cylinder attached; a rack of 12 E cylinders sits in an alcove open to the same corridor. This totals 15 cylinders in use (which are not used in volume calculation) and 12 cylinders in storage. According to NFPA 99-1999 4-3.1.1.2(c), the organization is allowed up to 3,000 cu. ft. (which equates to 120 E cylinders) in a protected environment per smoke compartment (for example, a clean utility room). Another acceptable example is a clean utility room with two racks holding 12 full E cylinders and a third rack with 12 empty or partially full cylinders. In an alcove outside the room, another storage rack holds 12 E cylinders. This totals 36 E cylinders in the smoke compartment, with 12 stored in a means of egress.

- **Storing cylinders:** Full cylinders in racks must be segregated from those that have been opened or used, per NFPA 99-1999 4-3.5.2.2.(b)(2). This eliminates confusion for health care personnel; if empty and full cylinders are not clearly separated, staff might accidentally retrieve a partially full or empty cylinder rather than a full one.

- **Bulk storage:** NFPA 99-1999 has very specific requirements for storage of nonflammable medical gases exceeding 3,000 cu. ft. (up to 20,000 cu. ft.), including providing 1-hour fire-rated room construction, ventilation, and explosion-proof electrical fixtures (such as motors and lights). Cylinders stored outdoors should be protected from direct exposure to the sun (the tank surface temperature must never exceed 130°F). In addition, tanks exposed to freezing temperatures should be handled with care.

(Contact: George Mills, gmills@jointcommission.org)
Piped medical gas: compliance and safety tips
This article provides compliance and safety tips for piped medical gas systems. Freestanding medical gas systems will be covered in a future issue of *Joint Commission Online*. These tips are applicable to ambulatory care, critical access hospital, hospital, long term care, and Medicare/Medicaid certification-based long term care organizations.

- **Inspection, testing, and maintenance:** Joint Commission Environment of Care (EC) standards require an organization to define and adopt a maintenance strategy for managing medical gases. EC.02.05.09, element of performance (EP) 1 requires an organization to define, in writing, time frames for inspecting, testing, and maintaining critical components of the piped medical gas system. Although the National Fire Protection Agency (NFPA) publication *NFPA 99: Standard for Health Care Facilities*, 1999 Edition (NFPA 99-1999) states that medical gas systems and components are to be tested, it does not specify with what frequency. Appendix C-4 of NFPA 99-1999 suggests testing methods and frequencies, but NFPA provides appendix material only as supplemental information and does not require the frequencies under the code. Some states and local jurisdictions may have specific requirements.

- **Breached and modified systems:** Whenever a piped medical gas system is opened – whether for new construction, repair, or renovation – the system must be tested for correct gas, gas purity, and correct pressure. In addition, the individuals who work on the piped medical gas system must be qualified (NFPA 99-1999, 4-3.1.2.12). These steps ensure safety; an accidental breach and subsequent repair could result in cross-connections or contaminated gases.

- **Clear and unobstructed access:** The qualified individuals working on gas systems must have clear and unobstructed access to the shut-off valves for medical gases (EC.02.05.09, EP 3; NFPA 99-1999, 4-3.1.2.3). The shut-off valves must be easily accessible in an emergency. If there were a fire, oxygen would accelerate its spread, so quickly cutting off the gas supply is critical. Placing the medical gas shut-off valves behind a door or other building feature is prohibited (EC.02.05.09, EP 3). Equally important is determining who has the authority to shut off medical gases during an emergency. Although maintenance staff might seem like a logical choice, they would not have immediate access during the emergency unless they are stationed in the area. Respiratory therapy staff, another seemingly logical choice, would also have a delayed response time since they might be in their department when a fire begins. Therefore, many organizations choose to have the unit charge nurse manage the decision to shut off the medical gas system during an emergency. This individual knows which patients are affected by a medical gas and can implement clinical interventions as the gases are shut off.

- **Labeling:** According to EC.02.05.09, EP 3, and NFPA 99-1999, 4-3.5.4.2, every shut-off location must have labels identifying the gases present and the areas served. This can be stated in ranges, provided that there are no breaks in the sequencing. For example, if 10 rooms were supplied with piped nonflammable medical gases from a wall-mounted shut-off and no other rooms were in the sequence, a range of rooms could be used (for example, Rooms 1–10). However, if an exam room were located between rooms 6 and 7, the signage would need to read as follows: Rooms 1-6, Exam Room X, Rooms 7-10. According to NFPA 99-1999, 4-3.1.2.13, 4-3.1.2.14, and 4-3.5.4.1, all gas piping must be labeled with contents, including the gas in the piping. In the interstitial space (the area between the lay-in ceiling and the roof or floor deck above), the piping must be labeled every 20 feet with its contents. All labeling must be current and accurate.

- **Discrete location of valves:** The medical gas shut-off valve cannot be in the same room as the area served (NFPA 99-1999, 4.3.1.2.3[m & n]). In a fire, isolating and shutting off the gas source must be done from a safe location – which would not be in the same room as the fire. One clarification: In an operating suite, where rooms are not required to be defined, the medical gas shut-off valve cannot be in the operating room; it must be outside that space.

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Tips for documenting fire response testing
Of all Joint Commission hospital surveys completed in 2011 and in the first half of 2012, 40 percent had findings at standard EC.02.03.05, which requires documentation of the maintenance, inspection, and testing of fire safety features. To demonstrate that all fire safety devices have been tested, organizations must list the devices on an inventory, whether electronic or paper. Simply counting the number of devices is not sufficient. For example, if 912 devices were tested last year, and 911 were tested this year, which one was missed? Without an inventory, the two years cannot be reconciled, and the missing device cannot be identified. A simple solution is to have outside contractors include in their bid the provision of a list of all devices. The organization can use the list to audit and correct the deficiencies and will have documentation that devices were tested.

In some instances, a surveyor requests documentation to verify that an organization successfully completed the required tests at EC.02.03.05. It is then discovered that the organization has not yet received the test results from its outside contractor. This is a problem because many of these tests are completed six weeks or more prior to the survey, and yet the organization does not know the condition of the fire alarm system, fire notification system, or fire suppression systems. Not knowing the test results causes The Joint Commission to question the level of safety provided by the organization. In this case, Leadership standard LD.04.01.05, EP 4, which states that “staff are held accountable for their responsibilities,” is scored as well as the EC findings because the fire safety testing is not adequately documented. The solution to this deficiency is also related to the request for bids from outside contractors, where the organization can require a daily work summary of all failed devices. Once the failed devices are identified, the organization can initiate a corrective action work order, which would be evidence that the system tested is reliable.

The documentation requirements for standard EC.02.03.05 are based on NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 1998 edition (Section 2-1.3), and NFPA 72, National Fire Alarm Code, 1999 edition (Section 7-5.2). EP 25 of that standard requires that the documentation include the following: name of the activity; date of the activity; required frequency of the activity; name and contact information, including affiliation, of the person who performed the activity; NFPA standard(s) referenced for the activity; and results of the activity. (Contact: George Mills, gmills@jointcommission.org)

Tips for ensuring corridor-related compliance
This article provides additional information about complying with corridor-related requirements. The August 8 issue of Joint Commission Online addressed managing corridor clutter and covered some exceptions to the National Fire Protection Association (NFPA) Life Safety Code®, including crash carts, isolation carts and cabinets, projections, stored patients, and computers on wheels. This article covers doors, walls, air supply, and headroom for corridors.

- **Latching patient room doors:** While doors to patient rooms are not required to have self-closing or automatic closing devices, these doors are required to have latches. The Joint Commission expects an organization to have in its fire plan a process to ensure that patient room doors close and latch in a fire emergency. This is why staff must check each patient room and close the door during a fire drill or fire event. For the past six years, The Joint Commission and the Centers for Medicare & Medicaid Services (CMS) have prohibited the use of roller latches (latches that have a roller that engages a socket or catch to fasten a door). An alternative to roller latches or door knobs are door latching devices that users can “hook” with an elbow to pull closed or push to open when carrying items.

- **Corridor walls:** In non-sprinkler-protected buildings, the corridor wall serves as a fire barrier. The corridor wall should have a 30-minute fire rating and walls that extend from the floor to the underside of the floor or roof above. There should not be any unsealed penetrations between the corridor and patient care rooms. In a fully sprinkler-protected compartment, however, the rating is removed and, according to the Life Safety Code, the corridor wall “shall be permitted to be separated from all other areas by non-fire-rated partitions and shall be permitted to terminate at
the ceiling where the ceiling is constructed to limit the transfer of smoke.” (See Joint Commission Life Safety (LS) standard LS.02.01.30, element of performance 6; and NFPA 101-2000, 18/19.3.6.2.1.)

- **Corridors and air supply:** The Joint Commission does not allow the use of the corridor as a part of air supply, air return, or air plenum (the ducting for return air). Years ago, a popular design involved pushing conditioned air into one end of a corridor and exhausting the air out at the other end. In a fire, however, this air flow could also spread a fire. This design is prohibited by LS.02.01.30, EP 13. However, LS.02.01.30, EP 21 allows the space above the ceiling to be used as unducted common air plenum for either supply or return air, provided that smoke dampers protect the air transfer openings extending through smoke barriers. However, many states no longer allow this design.

- **Headway:** The August 8 issue of *Joint Commission Online* included information on items projecting into the corridor. Headroom is an additional dimension that should be considered. For example, if a large screen monitor was mounted just above the handrail height, and angled forward to reduce lighting glare, the angled monitor must not lean more than 6 inches into the corridor. However, the *Life Safety Code* allows projections at 6 feet 8 inches or higher (NFPA 101-2000, 7.1.5) to accommodate exit signs and other projections near the ceiling. Therefore, an angled monitor could project more than 6 inches if it is mounted at a 6 feet 8 inch height or higher.

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**Managing corridor clutter**

Keeping corridors clear of clutter is essential for easing patient movement in any type of emergency. For example, one organization’s emergency response plan to a tornado involved moving patients into the corridor, away from patient room windows. Corridors that are clear of clutter do not cause any problems in this emergency response, but corridors with equipment already taking up space slow down this important process, when minutes matter. Reducing the materials that could contribute to a fire is another reason for keeping corridors clear.

The requirement for keeping corridors clear and unobstructed originates from the National Fire Protection Association (NFPA) *Life Safety Code®*. Federal law requires compliance with the *Life Safety Code*, which mandates that new health care “aisles, corridors, and ramps required for exit access in a hospital or nursing home shall not be less than 8 feet in clear and unobstructed width” (see NFPA 101-2000, 18.2.3.3). **Clear width** is defined as the net unobstructed width of the door opening, without projections. This width is essential for building occupants to exit unimpeded in a fire emergency. If an existing hospital has 8-foot-wide corridors, the 8-foot width must be kept clear.

**Crash carts and isolation carts:** The Joint Commission allows certain items, such as crash carts and isolation carts, to be stored in egress corridors (exit ways) as long as they are “in use.” Good medical practice dictates that a crash cart be ready for use at all times, so for purposes of the *Life Safety Code*, it can be considered to be always “in use.” An isolation or chemo cart may be in the corridor outside the room of a patient associated with the cart. The cart may remain if the patient leaves the room for any reason, such as for diagnostic testing. However, when the patient is discharged, the cart must be removed.

**Isolation cabinets:** Some organizations use isolation cabinets, which hang over the top of the door. According to the *Life Safety Code*, when the door is closed, the cabinet cannot project into the corridor more than 6 inches. In addition, with the cabinet hanging on the door, the door opening must still meet the *Life Safety Code* specifications of 32 inches clear width or 34 inches leaf for existing construction and 41½ inches for new construction.

**Corridor projections:** Another consideration is the prohibition against items projecting into the corridor more than 6 inches, including alcohol-based hand rub (ABHR) dispensers and bulletin boards. However,
wall-mounted items that project more than 6 inches while in use but when stored project less than 6 inches are permissible (for example, a keyboard or writing surface that drops down while in use and self-retracts when not in use). The limits for spacing, mounting height, and length of items on the corridor wall can be found in Life Safety (LS) standard LS.02.01.20.

30-minute rule: Any item that has not been used in the past 30 minutes is considered stored. The 30-minute limitation was defined by the Centers for Medicare & Medicaid Services (CMS) in a May 2010 “Survey & Certification” memo, which also includes information on the 6-inch projection topic. The intent of the 30-minute rule is not to have nursing staff nudge the object every 29 minutes, nor will a Joint Commission surveyor mark a wheel and come back 31 minutes later. Rather, if an item is not in use, it should be returned to storage. (This is not established in the Life Safety Code, but rather by CMS interpretation in S&C-10-18-LSC: Revision of S&C-04-41 dated August 12, 2004, “Corridor Width & Corridor Mounted Computer Touch Screens in Health Care Facilities – Clarification Effective Immediately,” dated May 14, 2010.)

“Stored” patients: According to the 30-minute provision, patients on gurneys who are waiting to be admitted to the medical/surgical units are considered “stored” in the egress corridor after 30 minutes. The Healthcare Interpretation Task Force (HITF) developed a policy position (see pages 2-3 of the HITF meeting minutes for December 9, 2008) on this practice. Both the Life Safety Code and the HITF interpretation are clear: Patient storage, sleeping, or treatment in corridors is prohibited (see NFPA 101-2000, Paragraph 19.3.6.1, Exceptions 1 and 6).

Computers on wheels: Mobile workstations pose a common corridor clutter problem. In a typical day, there are definite periods of mobile workstation use. But there are also periods when the computer on wheels sits idle. During these idle periods, the workstation must be stored in an acceptable place – which is not the egress corridor. Improperly managing mobile workstations may result in unintended clutter growth. At some point, someone parks a chair next to the workstation, then a trash can, and suddenly the mobile workstation becomes an unofficial nursing substation – and a violation of the Life Safety Code.

Possible solutions to corridor clutter:

- Share with staff the importance of keeping corridors clear to keep patients safe. In many emergencies, successful patient care can be associated with clear corridors. Having staff move equipment to make room for patients may delay patient care.
- Reduce the amount of unused equipment. Equipment stored as a convenience for staff should be returned to the department responsible for it (for example, a mobile X-ray machine should be returned to radiology), equipment associated with patient care could go into patient rooms, and other equipment might be stored off the units.
- Maximize dead-end corridors. An example of a dead-end corridor is one that ends at a window; if there are no doors in the first few feet, that is a dead-end space. The space between the window and the edge of the first door opening is a dead-end corridor. It does not contribute to the means of egress. If the space is less than 50 square feet, equipment can be stored there. That includes computers on wheels, gurneys, wheelchairs, and portable imaging systems, as long as they do not exceed 50 square feet (see NFPA 101-2000, Paragraph 19.3.2.1). Keep in mind that storage in a dead-end corridor requires that you install either quick-response sprinklers or standard sprinklers and smoke detection (see NFPA 101-2000, Paragraph 19.3.6.1, Exception 1 or 6).

Tips for maintaining fire and smoke barrier integrity

Although Joint Commission surveyors have found fewer major building issues over the past several years, they have discovered more issues related to the ongoing maintenance of the building, including penetrations, or breaches, in fire and smoke barriers. These breaches would allow smoke and combustion products to invade the adjacent compartment, diminishing patient safety. Joint Commission surveyors found unsealed penetrations in fire barriers in at least half (52 percent) of the surveys conducted in 2011 (scored at standard LS.02.01.10) and in smoke barriers in nearly half (45 percent) of the surveys (scored at standard LS.02.01.30). The real culprit undermining the integrity of barriers often...
involves activity above the lay-in ceiling assembly. These areas “above the ceiling” contain miles of cables, pipes, conduits, and other materials. When contractors running cable encounter a barrier and must penetrate the barrier – thereby breaching its integrity – the hole created to accommodate the cables (or any other penetrating material) must be properly repaired with appropriate material. Creating penetrations in barriers to accommodate building services is allowed as long as the organization repairs the barrier to restore its integrity.

Since it is not always clear who made the hole in the wall, the best suggestion for managing fire and smoke barriers may be to limit access to these barriers. One way to do this would be to put a “bounty” on those who are not authorized to have access to the barriers. The facilities department would create a “barrier access program” that grants access privileges and issues a dated work permit to those who need to work above the ceilings and potentially create penetrations in fire and smoke barriers. These work permits would be issued only after training workers on the barrier-repair process (referred to as “fire-stop” and “smoke-stop” repairs) or through an agreement identifying who will repair the opening. The work permit would be affixed to the ladder of the person working above the ceiling. If any staff member sees and reports someone working above the ceiling without a permit, a bounty would be paid out. An organization planning a barrier access program may consider:

- Reconciling life safety drawings with actual barriers.
- Requiring a label or stamp that identifies the type of barrier to be placed at access points.
- Requiring digital pictures of the correctly repaired opening if the contractor is going to make repairs.
- Conducting random barrier inspections to ensure they are being maintained.
- Requiring that a percentage of repairs be field tested to ensure they meet the design standards for the repair of an opening.
- Creating charts that identify proper fire- or smoke-stop techniques associated with the openings.
- Using one manufacturer of fire-stop products (to ensure consistent application).

In addition, organizations should make it an annual habit to ask, “Are the spaces around pipes, conduits, bus ducts, cables, wires, air ducts, and pneumatic tubes that penetrate fire-rated walls and floors protected with an approved fire rated material?” (See standards LS.02.01.10, element of performance (EP) 9, and LS.02.01.30, EP 18.) The organization’s assessment of existing penetrations and its ongoing management of present barrier penetrations should include scrutinizing the use of improper products to fill penetrations. For example, polyurethane expanding foam is often used to fill cavities between a window and the wall framing it. As it expands, it hardens into a beige material. The material has a UL label that attests to its insulating properties. When used as designed – only for insulation – it is encapsulated behind the drywall. However, some organizations have used this expanding foam to fill penetrations. But, because it burns rapidly and emits toxic smoke, it is never appropriate for either smoke- or fire-barrier repairs.

Unsealed penetrations can be placed on The Joint Commission’s electronic Statement of Conditions (SOC)™ as a Plan for Improvement (PFI) item. The Joint Commission allows the organization to group penetrations as a single PFI – provided the grouping is associated with a specific list or drawing that identifies specific numbers and locations. For example, a PFI could make this statement: “37 penetrations on 3West as identified on Life Safety Drawing 3W dated April 19, 2012.” Remember, the PFI cannot be closed until all 37 penetrations are corrected. Also, once a PFI is created, there must be an assessment of which Interim Life Safety Measures (ILSM) should be initiated, as defined in the organization’s ILSM policy. (Contact: George Mills, gmill@jointcommission.org)