Safe, Comfortable, and Efficient: Pick Two?

Navigating Code Compliance and Energy Efficiency for Surgical Suites

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ABSTRACT

Energy efficiency in medical facilities has lagged behind nearly all other building types over the last decade. Surgery areas are energy-intensive components of medical facilities and are an enticing target for energy efficiency. Surgical suites in ambulatory surgery centers (ASCs) are an ideal opportunity because most surgeries in these facilities are typically only scheduled during the day. Additionally, humidification requirements for surgical areas have changed over the years, but codes and standards have lagged behind.

Despite their potential, surgical suites are rarely targeted by facility managers for energy improvements. First, strict HVAC code requirements make navigating operational modifications risky in the minds of facility managers. Second, surgical services are major profit centers for medical facilities so facility staff are hesitant to interfere with day-to-day operation. Finally, surgeons demand highly-controlled environments to carry out their procedures. Because of these barriers, surgical suites are often considered untouchable by facility staff, and their efficiency efforts are directed elsewhere.

A recent Conservation Applied Research and Development (CARD) funded research project with the Minnesota Department of Energy Resources aimed to end the "pick two" dilemma for ASC surgical suites: choosing between safe, comfortable, and efficient. Why not have all three? The study focused on two measures based on current energy code requirements in Minnesota: reducing relative humidity based on recent guidance from standards bodies, and reducing ventilation in surgery suites during unoccupied hours. The team worked with the Minnesota Department of Health to develop waiver procedures and instructions to assist facilities in implementing both measures.

Introduction

Medical facilities are energy-intensive buildings with long hours of operation, high standards for occupant comfort and indoor air quality, and energy intensive procedure spaces such as radiology, laboratory, diagnostic testing, and surgery. Among medical facilities, hospitals have the highest energy intensity. Ambulatory surgical centers (ASCs) offer certain specialized services to patients but not as broadly as hospitals. Such specialized services are nevertheless still energy intensive. Along with at least one surgical suite within the facility, radiology and laboratory areas, procedure rooms, and standard examination rooms can be found in nearly every ASC.

Depending on the services offered, ASCs can be occupied up to 7 days per week for much of the day. In addition, due to medical code requirements in Minnesota, HVAC systems serving surgical suites in ASCs must operate 24 hours per day to maintain pressure relationships relative to adjacent spaces. For surgical suites, use of flammable anesthetics necessitated a code requirement for high relative humidity, which persists despite the industry's elimination of flammable anesthetics. According to research by ASHRAE, the industry also believed these higher humidity requirements also reduced the risk of infection and helped ensured patient safety (ASHRAE, 2009).

Despite the variety of energy requirements, ASCs have particular energy efficiency opportunities. Recent health care facility guidelines have reduced the relative humidity setpoint requirements for operating rooms (ORs). This presents an opportunity to save humidification energy across the board. Additionally, unlike hospitals, ASCs have a daily schedule of surgeries and operating rooms are not generally occupied 24 hours per day. While some ASCs schedule certain HVAC equipment, most facilities operate the HVAC equipment serving surgical areas continuously at full load, regardless of occupancy. Modern guidelines for health care facilities allow for an unoccupied "setback" mode for surgical space HVAC equipment as long as certain pressure requirements are maintained. Surgical spaces can still be maintained at comfortable conditions for procedures as requested – often demanded – by medical staff, and set back to less aggressive setpoints when unoccupied.

Though there is significant energy efficiency potential for ASCs, there are also several barriers. First, for medical buildings, patient health outcomes and experience trump any energy consideration. Energy costs are considered a fixed (and increasing) operating expense for many facilities. Second, medical code compliance and internal safety protocols make adjustments to the facility operation more difficult than similar adjustments to office buildings, for example. Finally, outpatient medical facilities, as an industry, simply don't have a track record of improving efficiency. According to the Commercial Building Energy Consumption Survey (CBECS)[1], the overall energy use intensity for "outpatient health care" facility remained constant between 2003 and 2012, reported at 95 kBTU/square foot for both survey years (U.S. Energy Information Administration 2003, 2012). One possible reason for the lack of efficiency improvement could be the higher prevalence of rented spaces over owner-occupied facilities. Renters have less incentive to improve the facility since they are not usually tied it long-term, especially if the energy-using equipment serves more than one rented space in the building. However, the CBECS data is unclear as to what portion of the facilities surveyed are rented versus owner-occupied.

Codes and standards are the opportunity to promote energy efficiency while also maintaining patient comfort and safety. Medical facility staff are hesitant to implement changes to HVAC operation that might have an impact on patients. Integrating recommendations on energy-efficient practices in facility codes directly offers a measure of security for facility staff. In short, inserting such recommendations directly in codes say, "You can do this and nobody will get hurt." It is a powerful tool, one that typical energy efficiency advocacy by contractors or utilities cannot match.

This paper will address two specific opportunities for ASC energy efficiency in Minnesota. Through a Conservation Applied Research and Development (CARD) grant from the Minnesota Department of Commerce's Division of Energy Resources, a research project team investigated specific code requirements for operating room humidification and ventilation requirements.[2] The team, comprised of engineers and energy-field experts, worked with Minnesota's Department of Health to draft guidance for reducing relative humidity levels in

[1] The Commercial Building Energy Consumption Survey (CBECS) is a national survey of commercial buildings in the United States, which collects building data and energy use among several different facility types. Energy data is then reported in the aggregate, as well as broken out by facility type, fuel type, and end use.

[2] Sections of this white paper were adapted from the CARD report produced for the Minnesota Department of Commerce. Information on this final report are included in the References section.

operating rooms, and setting back operating room ventilation and air change rates during unoccupied hours.

Code Requirements for Surgical Suites at the National Level

Relative Humidity

Humidification requirements for surgical suites have a long history. The 2000 edition of the National Fire Protection Association (NFPA) 99 code for health care facilities required a minimum of 35% relative humidity in anesthetizing locations. According to the American Society of Healthcare Engineers (ASHE), this requirement dates back to static discharge concerns and flammability risks with older anesthetics (ASHE 2012). Another concern involved increased risks of infection at lower relative humidity.

In 2009, the American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) conducted a literature review on the effects and potential risks of reduced relative humidity in operating rooms. The ASHRAE Standing Standard Project Committee 170 concluded that there were no direct correlations between increased rates of infections and relative humidity below 30%. The committee also concluded that there was no correlation between fire risks and relative humidity below 35% (ASHE 2009).

As a result of this research, ASHRAE recommended and subsequently approved changes to Standard 170 to reduce the minimum relative humidity requirement to 20% for short-term patient stay areas, including operating rooms. This updated guidance is also reflected in the most recent updates to the 2012 edition of NFPA Standard 99.

There has been some pushback to this code revision. Medical supply manufacturers remarked that certain medical supplies must be stored and used in an environment maintained at 30% relative humidity. Such equipment has specific requirements listed on the item's respective Instructions for Use (IFU). Continuing guidance from industry groups is that facilities interested in making the reduction to 20% relative humidity must make sure to catalogue equipment stored in the affected space, and verify that no items require higher relative humidity (ASCA et al. 2015). In general however, the relaxation of relative humidity levels has been well-received by those in the medical facility and medical device industry committed to energy efficiency.

Airflow and Ventilation

Requirements for airflow and ventilation to surgical suites have also changed slightly over time, though less is known about the background regarding the exact values listed in published guidelines. ASHRAE Standard 170-2013 outlines the guidance for conditioning and ventilating operating rooms. In section 7.2.1, Table 7-1 gives the recommended total air change rates, outside air change rates, and pressurization requirements for operating rooms. For "classes B and C operating rooms" (also referred to as outpatient operating rooms, which are 250 square feet or larger), the areas must have positive pressurization relative to adjacent areas, a minimum outdoor air change rate of 4 per hour, and minimum total air change rate of 20 per hour. This appears to be a common recommendation regardless of climate zone.

The minimum outdoor and total air change rates have varied slightly from 5 and 25 (respectively) in 1999 to the 2013 iteration of the code. Since at least the 1999 version of the guidelines, operating rooms have been required to be positively pressurized at all times.

Standard 170-2013 also provides general guidance on the conditioning and ventilation of operating rooms during unoccupied periods: "…for spaces that require a positive or negative pressure relationship, the number of air changes can be reduced when the space is unoccupied, provided that the required pressure relationship to adjoining spaces is maintained while the space is unoccupied and that the minimum number of air changes indicated is reestablished anytime the space becomes occupied" (ASHRAE 2013).

In reviewing these guidelines, it is clear that the main requirement for operating rooms is to maintain them at positive pressure with respect to adjacent non-surgical spaces. Adjustments or setbacks to airflows at night or on weekends is allowable under code, as long as the pressure relationships are maintained at all times. The lack of specific unoccupied modes in published code requirements is noted and discussed further in this paper.

Code Requirements in Minnesota

The Minnesota Administrative Rules are a set of codes that cover requirements for maintaining surgical spaces within ASCs. Unlike national guidelines, the Minnesota codes are laid out by building type (hospital, clinic, ASC), rather than space type (operating room, sterile storage, etc.). This means that requirements for hospital operating rooms may differ from requirements for ASC operating rooms. The scope of this research focused only on operating rooms for ASCs due to the greater opportunities for scheduling.

Relative Humidity

While at the national level there have been modifications to relative humidity requirements, Minnesota codes have remained largely constant over the years. Chapter 4675 of the Minnesota Administrative Rules outlines the requirements for operation of "outpatient surgical centers", which are synonymous with ambulatory surgical centers. Within this chapter, section 1600 dictates the rules for HVAC equipment. Specific design guidelines for temperature and humidity are described in Subpart 1: "[t]he systems shall be designed to provide temperatures and humidities as follows: A. operating rooms: 70 to 76 degrees Fahrenheit (variable range), 50 to 60 percent relative humidity" (Minnesota Admin. Rules).

Though these may be read as design requirements and not necessarily operating requirements, no other section in the Minnesota codes outlines actual operating requirements for ASC operating rooms. Also, it is unclear why the Minnesota code requires a design minimum of 50% relative humidity, which is already higher than the previous NFPA 99 requirement. However, in light of the most recent changes to code and guidance from the U.S. Centers for Medicare & Medicaid Services (CMS) and other industry experts, there is significant opportunity for energy savings by observing the most recent recommendations on relative humidity.

Excessive humidity levels can have negative impacts on spaces and occupants. Humid areas are generally uncomfortable for space occupants. High humidity levels may lead to increased risk of mold and mildew in spaces, affecting both patient health and facility cleanliness. The project team did not specifically investigate the infection risks of Minnesota's higher minimum humidity in operating rooms relative to the national recommendation, but a brief literature review suggests that the link between relative humidity alone and infection rates is unclear. Viral infection rates are dependent on multiple factors including temperature and location in addition to humidity. Additionally, the relationship between infection rates and humidity levels depends greatly on the particular pathogen in question. For example, certain viruses thrive in low humidity environments where others are more suited to high humidity environments (Memarzadeh 2011). A weeklong study performed at The Ottawa Hospital in Ontario, Canada found that relative humidity levels in excess of 65% in surgical suites did not lead to a higher rate of patient infections (Bruce et al. 2007).

Airflow and Ventilation

Subpart 4 of the Minnesota Administrative Rules, section 4675.1600, dictates the pressure requirements for ASC operating rooms: "The ventilation systems shall be designed and balanced to provide the pressure relationships as shown in part 4675.2800" (Minnesota Admin. Rules).

The table given in section 4675.2800 highlights the specific requirements for ventilation and pressure relationships. For an "operating room", the area must have positive pressurization relative to adjacent areas, a minimum outdoor air change rate of 5 per hour, and minimum total air change rate of 12 per hour (Minnesota Admin. Rules).

The Minnesota code is consistent with ASHRAE Standard 170 in that operating rooms must be positively pressurized at all times with respect to adjacent non-surgical areas. In speaking with the Minnesota Department of Health, this is the single most important parameter for operating room HVAC systems. However, the exact number of air changes differs between Minnesota requirements and the ASHRAE guidelines, with the minimum outdoor air changes exceeding the ASHRAE standard, but minimum total air changes being less than ASHRAE. Additionally, unlike ASHRAE 170-2013, the Minnesota code neither allows nor forbids setbacks to total or outside air change rates during unoccupied periods. Explicitly allowing for unoccupied airflow setbacks in the Minnesota code directly would guide facility managers to achieving significant energy savings in their buildings, while also certifying that their facilities would still be deemed safe. The project team explored adding this guidance to Minnesota code with the Minnesota Department of Health during this research project.

Potential for Savings

Relative Humidity Minimum Reduction

Adopting the lower relative humidity requirements for surgical suites as laid out by the latest ASHRAE Standard 170-2013 would lead to significant savings potential for ASCs in Minnesota. Calculating the exact savings potential for a facility is heavily dependent on the HVAC equipment in place, baseline operation of the units serving the surgical suites, and weather data. As part of this research, the project team estimated savings as a function of surgical suite area and assumed operation of the HVAC units.

For the CARD report, the project team estimated an annual equipment load savings of 0.08 mmBTU per square foot of operating room space. Equipment load savings can be converted to net energy savings by dividing equipment load by the efficiency of the humidification equipment. The team used the following assumptions to estimate this metric:

- TMY3 weather data for Minneapolis, MN
- Reduction from 50% relative humidity to 20% relative humidity
- Five air changes per hour of outside air and 12 air changes per hour total, per Minnesota Administrative Rules, section 4675.2800

- 60°F maximum outside air temperature for humidification

As an example, consider a typical 500-square-foot operating room currently humidified to 50% relative humidity. The room is served by a dedicated air handling unit equipped with an electric steam humidifier. By reducing the relative humidity setpoint to 20%, the facility could achieve an annual electric savings of over 11,000 kWh. At a blended rate of $0.07 per kWh, this equates to an almost $800 annual savings. While this may seem relatively small, this kind of a modification would require very little, if any, controls labor and virtually no equipment changes. It's also a valuable measure for reducing peak demand. Finally, it's important to note that many facilities have multiple operating rooms. A typical ASC can easily have three dedicated operating rooms, and such a measure would result in almost $2,400 in annual electric bill savings. Not only will reducing the relative humidity setpoint save in energy costs, but it will also likely improve patient and staff comfort while in surgical spaces.

Airflow and Ventilation Setback

Airflow and ventilation setbacks for surgical suites during unoccupied periods also has a high potential for savings. However, unlike relative humidity reduction, adjusting unoccupied airflow and ventilation is much less straightforward and requires more engineering and may even require equipment investment to implement. Savings for such a measure is also heavily dependent on the particular system serving the surgical spaces and the baseline operating parameters of that system.

One portion of setback savings relates to the reduction in ventilation during unoccupied hours. Initially, the project team estimated savings for reducing outside air changes from five per hour (as currently required by Minnesota code for ASCs) to zero during unoccupied periods. However, ASHRAE Standard 170-2013 also has a ventilation requirement for spaces designated as "sterile storage", which is two outside air changes per hour. It is not immediately clear why sterile storage areas need ventilation but it is likely designed to ensure proper filtration and ventilation of the space for occasional occupancy (facility staff entering and exiting the room, while leaving the door open).

Operating rooms may have sterile equipment and supplies stored within them, in addition to dedicated sterile storage areas elsewhere in the facility. Therefore, the team determined that a more appropriate reduction to two outside air changes per hour during unoccupied times would result in energy savings while also meeting a more conservative code threshold. It must also be acknowledged that completely turning off ventilation to surgical spaces (but still maintaining positive pressurization) would be a large departure from normal practices for facility staff. Using formally-published requirements for both occupied and unoccupied periods would give facility staff a measure of reassurance when making significant changes to the operation of their surgical suites. A particular facility that does not store sterile equipment in the OR during unoccupied times could theoretically eliminate ventilation completely and maintain code compliance.

Using the more conservative reduction from five to two outside air changes per hour during unoccupied periods, ASCs could save approximately 0.5 therms per square foot and 1.1 kWh per square foot of OR space annually. The team used the following assumptions to estimate these savings:

- TMY3 weather data for Minneapolis, MN
- 80% efficient heating equipment and 12 EER cooling equipment

- Operating rooms are currently ventilated continuously
- Operating rooms are unoccupied 12 hours per weekday and 24 hours on weekends
- Reduction from four outside air changes per hour to two per hour during unoccupied hours
- 60°F building balance point

Using the previously considered 500-square-foot operating room example, the facility could save 230 therms and 560 kWh annually, with a total cost savings of just over $200 per year (using $0.75/therm and $0.07/kWh). For a facility with three operating rooms, this is over $600 per year in ventilation savings.

These are not a particularly enticing figures. However, the above metrics reflect ventilation savings only and do not include potential fan savings if supply airflow is also setback along with outside air change rates during unoccupied periods (while still maintaining positive pressurization). Depending on the system type, additional savings can be achieved (such as reheat). Due to the complex nature of operating room HVAC systems, it is difficult to produce a one-size-fits-all savings metric for ASCs for setting back supply airflows to operating rooms during unoccupied periods. Instead, Table 1 lists calculated savings reflecting implementation of both ventilation and airflow setbacks in operating rooms in medical facilities in the Midwest. The savings come from a variety of past energy studies performed by the project team's consulting firm, and are normalized assuming a typical OR area of 500 square feet.

Table 1. Savings from previous energy studies for operating room airflow setback implementation at various medical facilities, assuming an average OR area of 500 square feet

Operating Room HVAC Description	Annual Electric Savings per Square Foot of OR Space	Annual Gas Savings per Square Foot of OR Space
2 operating rooms Dedicated VAV System, Chilled Water Cooling, Hot Water Heating, Electric Steam Humidification	42.6 kWh/sq ft OR	0.4 therms/sq ft OR
3 operating rooms Shared VAV System, Chilled Water Cooling, Hot Water Heating, Electric Steam Humidification	112.8 kWh/sq ft OR	7.0 therms/sq ft OR
5 operating rooms Shared VAV System, DX Cooling, Mix of Gas-Fired Heating and Electric Reheats, Gas-Fired Steam Humidification	136.0 kWh/sq ft OR	4.2 therms/sq ft OR
2 operating rooms Shared VAV System, Chilled Water Cooling, Hot Water Heating, Gas-Fired Steam Humidification	102.7 kWh/sq ft OR	15.9 therms/sq ft OR
2 operating rooms Shared VAV System, Chilled Water Cooling, Hot Water Heating, Electric Steam Humidification	152.3 kWh/sq ft OR	7.4 therms/sq ft OR

The average annual savings for both airflow and ventilation reduction is about 113 kWh/sq ft and 6 therms/sq ft. If a particular facility has three operating rooms at 500 square feet each, the estimated annual energy cost savings would be over $6,000 (again using $0.75/therm and $0.07/kWh). Note that the savings values from the studies above also include reductions in reheat, humidification and dehumidification loads in addition to fan speed adjustments and ventilation reductions. Also, most facilities were observed to be exceeding the Minnesota code requirements for operating room ventilation and airflow, so savings (especially gas) exceed the metrics estimated previously. Nevertheless, implementing such airflow setbacks for operating rooms have the potential to save significant energy. These average savings values greatly exceed the simple metrics for reducing ventilation alone, underscoring the importance of detailed engineering studies to properly design the setback sequences and estimate the overall savings among all systems: heating, cooling, and humidification.

Implementation of Airflow and Ventilation Setback

As previously noted, setting back airflow and ventilation to operating rooms is not a straightforward recommendation. Implementation complexity, cost, and energy savings are all heavily dependent on the HVAC system serving the operating rooms. In general, such modifications require digital controls on all HVAC equipment with a building automation system (BAS) capable of integrating with some kind of occupancy sensor or activation device in the surgery area. Additionally, variable-air volume (VAV) systems are required in order to achieve airflow setbacks while also maintaining positive room pressurization. Positive pressurization is maintained by preserving a particular supply-return air differential that generates a constant pressure differential with the adjacent spaces. Put simply, operating rooms must have higher net supply air delivered than adjacent spaces. The ideal system for implementing surgical suite setbacks is one with dedicated supply and return air VAV boxes serving surgical spaces. If surgery areas do not have dedicated return air VAV boxes, more complex controls strategies must be employed.

In a system with both supply and return air VAV boxes, implementing an airflow setback is relatively simple. In occupied mode, the supply air VAV boxes are set to provide the code-required air change rates for the spaces served (in this case, surgical suites). Return air VAV boxes are set to maintain the required pressurization of the surgical suite (minimum +0.01 inches of water column, or in WC). The supply fan maintains a given static pressure setpoint, which is a function of the VAV box damper positions. The return fan operation varies from building to building depending on the contractor, but usually operates at a set airflow or fan speed differential from the supply fan. During unoccupied mode, the supply VAV box damper positions close to provide the unoccupied airflow setpoint, with return VAV boxes adjusting to maintain the same pressurization of the space as occupied mode. The reduction in VAV box supply flow will cause the supply and return fans to slow down, and reduced airflow volumes to require less reheat, all of which result in energy savings.

For systems with only supply air VAV boxes, implementation of airflow setbacks is more complex. Depending on the location of the operating room with respect to the return duct line, it may be possible to temporarily slow down the return fan speed to maintain positive operating room pressurization with respect to adjacent areas. After the return fan speed is reduced, supply fan speed can then be reduced to the unoccupied setpoint. If this strategy is not feasible, installation of return air dampers may also be required to provide additional control over space pressurization. During occupied mode, the system operates as normal with the return air dampers fully open. During unoccupied mode, the return dampers close to a pre-calibrated unoccupied position. This position is set such that the operating room maintains a positive pressurization at the reduced supply airflow. Return air dampers can mimic some of the basic operation of a return air VAV box, but installing and tuning the dampers is a much more involved process that requires significant design and engineering expertise.

Similar Efforts in Other States

State codes vary widely across the country for both relative humidity and ventilation requirements. The project team conducted a small survey of five other states to assess similarities to the Minnesota codes, as well as to find examples of state code revisions or guidance based on new energy-efficient practices.

Based on the small selection of states reviewed for this research, relative humidity requirements generally follow the FGI Guidelines for Health Care Facilities and ASHRAE 170-2013 in some form. Neighboring states Illinois and Iowa both adopt the 2015 International Mechanical Code (IMC) for commercial buildings. Section 407.1 of the 2015 IMC specifically notes that such spaces must be designed to meet the requirements of ASHRAE 170. Wisconsin also explicitly defers to FGI guidelines for all requirements not specifically laid out in the Wisconsin mechanical code, which includes relative humidity requirements within operating rooms. Minnesota is the only state identified in this small survey that still requires relative humidity greater than 30% for operating rooms in ASCs.

Categorical airflow setbacks for operating rooms have not been widely adopted in state codes despite recent guideline updates from industry organizations. One exception is the California Mechanical Code, which does provide direct guidance on operating room airflow setbacks. Section 407.1.1 exception 2,2 states that during unoccupied periods, it is acceptable for surgical suite airflow to be reduced to a total of six air changes per hour. The project team found no other examples of this specific allowance within state codes.

Approved Procedures in Minnesota

The project team discussed reducing relative humidity requirements for operating rooms and allowing for unoccupied setbacks to air change rates with the Minnesota Department of Health (MDH). The regulatory environment for ambulatory surgical centers in Minnesota is less straightforward than for medical clinics and hospitals. Many of the statutes that apply to hospitals do not directly apply to ASCs. Specifically, certain waiver processes laid out for hospitals (section 144.6535 of the Minnesota Statutes) are not in place for ASCs. The project team and MDH therefore reviewed and developed two measures for approving these energy-efficiency modifications for ASC operating rooms.

The Minnesota rules for ASCs do not specify that air change rates are required at all times. ASHRAE 170 notes that, during unoccupied times, air change rates can be reduced so long as pressure relationships are maintained. Based on conversations with MDH, the Engineering Services section has published a "notification letter" for ASCs to submit if the facility plans on reducing air change rates for surgical suites during unoccupied hours. The letter was developed to ensure facility staff understand that pressure relationships between surgical and adjacent areas must be maintained at all times, as required by ASHRAE 170.

Regarding humidity level reduction, a “request for equivalency” has also been published by MDH. ASCs considering reducing humidity levels in surgical spaces can use the request in the same manner as a waiver for hospitals. The request document will be required as relative humidity is specifically controlled by Chapter 4675, section 1600 of the Minnesota Statutes.

Copies of both letters are published on the Engineering Services website for MDH.

Conclusions

Energy-efficient technologies, such as LED lighting, have transformed the energy landscape for buildings. As these kinds of energy opportunities are being identified and achieved in ASCs, energy professionals will need to think more broadly to continue to push the efficiency envelope.

In the case of Minnesota ambulatory surgical centers, it’s clear that the current code requirements can be improved. Revising relative humidity requirements to match national guidelines modernizes the Minnesota code, can improve occupant comfort, and reduces the risk of mold and mildew formation. Clarifying surgical suite HVAC operation and documenting methodology for setting back airflow and ventilation to these spaces during unoccupied times provides further energy efficiency potential for ASCs. The point of this process is not to eliminate code requirements only to save energy, but rather to examine code requirements in light of new capabilities and building practices to determine what is actually needed to maintain patient safety and comfort.

The primary goal of HVAC requirements in building mechanical codes is to lay out the operating parameters that will provide proper conditioning and ventilation to occupants, ensuring occupancy safety and comfort. But facility codes can also allow for energy-efficient practices which provides an opportunity to ensure both safe and efficient building operational practices. Updating facility codes with these kinds of guidelines can also provide peace of mind to energy-conscious facility managers.

At the same time, as energy professionals, it’s crucial to remember that patient safety is the first priority for health care facilities. Expect some amount of hesitation on the part of facility staff, as any breach of protocol can be a major disruption to the facility. However, showing that state regulating agencies and national guidelines allow for these kinds of energy-efficient practices will certainly pave the way for increased implementation in ambulatory surgical centers going forward.

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