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Relative Humidity in the OR Environment

Background:

In many locations across the country, cold weather or desert climates create dry environmental conditions. In order to achieve the higher levels of humidity required by regulatory agencies, hospitals and ambulatory surgery centers have to add humidity into the building air, an activity that is expensive and creates its own unique set of challenges.

At the request of a number of healthcare delivery organizations (HDOs), ASHRAE (the American Society of Heating, Refrigeration and Air Conditioning) updated its national standard for HVAC design parameters[1]. The environmental relative humidity (RH) for anesthetizing location, including operating rooms, was changed to expand the minimum end of the range from 30% to 20% RH.[2] The upper limit remains at 60% RH.

The ASHRAE standard change does not address the clinical impact of the expansion of the minimum RH range to 20% on the supplies and equipment used in anesthetizing locations, including the OR environment. Required environmental relative humidity for supplies and equipment is stated in the manufacturer's Instructions for Use (IFUs, sometimes called DFUs).

The Centers for Medicare & Medicaid Services (CMS) is issuing a categorical Life Safety Code (LSC) waiver permitting new and existing ventilation systems supplying hospital and critical access hospital (CAH) anesthetizing locations to operate with a RH of ≥20 percent, instead of ≥35 percent.

One healthcare organizations approach to relative humidity in the OR environment:

The first step in any organization's assessment should be how often their RH levels are above or fall below the 20% RH limit. Listed below are three options that this organization evaluated before deciding on their current course of action.

This is not an endorsement of any single approach, nor does it represent a comprehensive solution. Rather the intent is to share one way an organization has addressed, and reviewed the clinical impact the expansion of the RH range has on medical equipment and supplies.

Option #1

Conduct a risk assessment and evaluate the cost and energy required to maintain an RH of 20%. The resulting assessment determined that the costs to replace air handlers and other equipment was significant while the impact to surgical supplies such as ECG electrodes and their replacement costs, if the electrodes did not work, was low. This option was designated as a high cost, low risk option and was no longer pursued.

[1] ANSI/ASHRAE/ASHE 170-2013, Ventilation of Health Care Facilities.

[2] The 1999 edition of NFPA 99, Health Care Facilities required ≥35% RH in anesthetizing locations, including the OR. For purposes of simplicity, these communication points refer to the prior ASHRAE limit of 30% rather than both the different prior ASHRAE and NFPA limits.

Option #2
Assess all affected supplies and equipment, discarding those that could not be used within a 20% RH environment. The reality of this approach, however, was the large numbers of medical equipment and supplies that would need to be evaluated, as well as the resource time and effort required to obtain IFU data. Outreach efforts included the manufacturers, distributor, and GPO communities as well as other provider organizations. The outcome ended with mixed results. Due to the magnitude and outcomes of this effort, this option was no longer pursued.

Option #3
The option that this organization ultimately landed on was to focus on whether or not the use of the supply violated the IFU. In their review, it was found that very few devices and supplies stated that they *should not* be used in a 20% RH environment. Supplies and devices were broken down into categories with a sampling approach conducted within the categories. If it was not clearly stated that the supply should not be used in a 20% RH environment, the supply and device was used. Additional factors incorporated into the use decision were:

- The likelihood of an issue if the supply or device was used.
- Were there any actual issues documented?
- The severity of an issue if one occurred using a high, medium, low severity scale.

The organization continues to nimbly move forward with option three, assessing more supply and device categories and compiling additional IFU data as it is discovered.

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