



AHA Webinar

Is the MicroBiome Study Published?

The MicroBiome Study data on microbes in the built environment and indoor conditions is currently in press 2016, and is expected to be published early 2017. The publication date for the patient outcome data is uncertain (delicate subject for hospitals), but is available in the peer reviewed "Indoor Air 2016" proceedings.

Is there any research being done on using clean steam humidifiers rather than chemical laden boiler steam?

Lots of research has actually been done on this in the past:

- NIOSH Health Hazard Evaluation Report (HETA 83-020-1351) [1983]
- NIOSH Health Hazard Evaluation Report (HETA 2000-0169-2854) [2000]
- University of Minnesota Use of Amines in the Steam Production and Distribution System
- "Is Primary Direct Steam Humidification Compromising Your Indoor Air Quality?" by Loraine Huchler, PE
- "Direct Steam Injection Humidification: Is It Safe for Building Occupants" by Joanna Turping

At what temperature was the Microbiome Study completed?

Temperature range was 22-25°C.

From a health perspective, what is the optimal Relative Humidity?

Optimal Relative Humidity is 40-60% for occupants.

The pharmaceutical industry uses USP/WFI water (sterile) water... do you see the healthcare industry utilizing these purified water systems for humidification with the acceptance of Addendum M?

No, we don't see USP/WFI water being adapted into the hospital facilities for humidification purposes. With steam systems there is little argument for this. It could be considered for direct room systems, but likely would be cost prohibitive.

Do you advise starting with patient room humidity if that can be done? Or the entire facility?

Certainly, the place where the patients spend the most time is the most important. If you follow patient flow and see how they move around the facility, you realize they are exposed to many areas. Proper RH levels throughout the entire building are ideal.

Are HAI's affected by Absolute Humidity levels or Relative Humidity levels?

Relative Humidity is the key indicator that affects HAI's. Statistical analysis was done to eliminate confounding variables.

Where is the best place to monitor RH levels?

Generally, RH is best monitored at all return air registers. But, depending on room size and configuration the RH measured at the return air (usually at the ceiling) may not always represent the humidity at the occupant level.

Is it more difficult to maintain proper humidity in an air conditioned or heated environment?

Stable temperature control goes hand in hand with stable relative humidity levels regardless of current HVAC mode. Practically though, it is harder to maintain in a cool environment:

- Large volumes of outdoor air being used for economizer cooling can often have a significant drying effect on the space (especially during shoulder seasons).
- Air conditioning coils often operate below the dewpoint of the air and will remove moisture. Modern system designs in hot / humid climates benefit from dissociating the humidity control from the cooling by adding desiccant systems.

Is natural ventilation better than mechanical ventilation?

Not necessarily. Natural ventilation does offer energy benefits and it is often achieved through operable windows, increasing occupant satisfaction. However natural ventilation can also "open the door" to pressurization issues, infiltration of dust, insects, particulates, intake of excessively damp / dry air, and other problems.

In microbiome study were there any confounding variables considered or discovered?

We considered the interplay of all variables. The analysis we used, multivariable linear regression (#HAIs per month as the dependent variable, against all the room measurements) determined both the R² and potential significance of each independent variable. This analysis model specifically identifies confounding variables, so we can correctly state that the p<.02 relationship between indoor RH and patient HAIs was not influenced by any of the other measured conditions.

Energy and cost is a big concern for keeping RH levels at 40 or above. Are there newer options to help control energy and cost?

Ultimately physical laws define the energy needed to convert liquid water into vapor. However, advances in adiabatic (evaporative) systems, new gas fired options, better control strategies, and general improvements in product efficiency provide lots of opportunities for minimizing the impact of the humidification system.

Can you summarize the dehumidification and humidification monitoring and control improvements included in the 250 bed hospital example with the 500% ROI?

Addition of Gas-fired steam humidifiers, steam distribution equipment and humidity sensors. The design was intentionally set to give conservative numbers by dividing the 250 rooms up among 53 zones, each with dedicated humidification equipment. More likely this size of facility would have fewer zones and thus less equipment. Estimates for installation, commissioning, and annual maintenance are also included. Assumptions include existing natural gas infrastructure within the facility, and an existing building automation system.

What are some study references on fungi requiring liquid water?

There was a seminar on this at the 2015 ASHRAE Summer Conference called "How Dry Am I". The seminar included NRC, Lew Harriman, as well an expert from the food industry. The argument here is that liquid water is key, and in particular the water activity factor (aW). 2009 WHO guidelines for indoor air quality: dampness and mold is also a good reference. Please contact Nortec if you need further information.