

ROTRONIC APPLICATION NOTE

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Importance of Temperature and Humidity in Hospitals



Facts & figures:

RH (expressed in percentage) describes the amount of water vapor held in the air at a specific temperature at any time, relative to the *maximum* amount of water vapor that air at that temperature could *possibly* hold.

At higher temperatures, air can hold more water vapor, and the relationship is roughly exponential—air at high temperatures can hold *much more* water vapor than air at lower temperatures.

Control of Temperature and Humidity in Hospitals

Temperature and relative humidity affects the airborne survival of viruses, bacteria and fungi. Thus environmental control in hospitals is important because of infectious disease transmission from the aerosol or airborne infection.

Environmental exposure is a common hazard for all such organisms (whether viruses, bacteria or fungi) during this journey between hosts. Factors such as temperature, humidity (both relative and absolute), sunlight (ultraviolet light) exposure and even atmospheric pollutants can all act to inactivate free-floating, airborne infectious organisms.

Maintaining hospital premises at a certain temperature and a certain relative humidity (%rh), likely to reduce the airborne survival and therefore transmission of influenza virus.

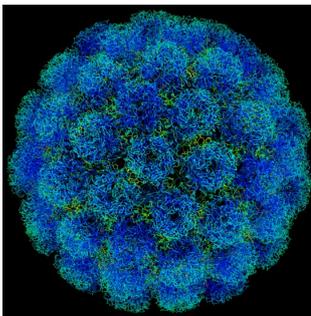
Temperature and RH settings in different parts of a hospital differ slightly between summer and winter.

In summer, the recommended room temperatures range from 23°C-27°C in the ER (emergency room), including in-patient and out-patient areas, as well as X-ray and treatment rooms and offices.

The corresponding recommended RH is fairly constant throughout the hospital, between 50-60%rh.

In winter, the recommended temperatures are generally slightly lower, ranging from 20°C in some in-patient and out-patient areas, as well as offices, up to 24°C -26°C in in-patient and out-patient areas.

The recommendations for the newborn baby and the hydrotherapy treatment rooms are higher at 27°C -28°C. Again, the corresponding recommended range of RH is fairly constant, but slightly lower than for summer, ranging from 40%rh -50% rh, but up to 55%rh-60%rh for more critical areas, such as operating theatres and recovery, the intensive care unit and childbirth/delivery suites.



Why the need to measure relative humidity?

Temperature is one of the most important factors affecting virus survival, as it can affect the state of viral proteins and the virus genome. Virus survival decreases progressively at 20.5°C -24°C then < 30°C temperatures. This relationship with temperature held throughout humidity range of 23%rh- 81%rh.

Virus: The survival of viruses and other infectious agents depends partially on levels of RH. At a temperature of 21°C, influenza survival is lowest at a mid-range 40%rh-60%rh. It is also important to note that temperature and RH will always interact to affect the survival of airborne viruses in aerosols.

Temperatures above about 24°C appear to universally decrease airborne bacterial survival.

Bacteria : For bacteria, the effect of carbon monoxide (CO), enhanced the death rate at less than 25%rh, but protects the bacteria at higher RH ~ 90%rh.

Fungi: Ventilation systems controlling Temperature and Humidity have a significant effect on indoor levels of airborne fungi, with air-handling units reducing, but natural ventilation and fan-coil units increasing the indoor concentrations of airborne fungi. Dehumidification as well as HEPA filtration can be used to improve indoor air quality.

At High temperatures < 30°C and at high RH < 50%rh may reduce the survival of airborne influenza virus.

Different airborne infectious agents (i.e. viruses, bacteria and fungi) will have differing conditions under which they may be optimally suppressed; it will need to be decided which airborne pathogen poses the most risk to patients and staff alike in hospitals.

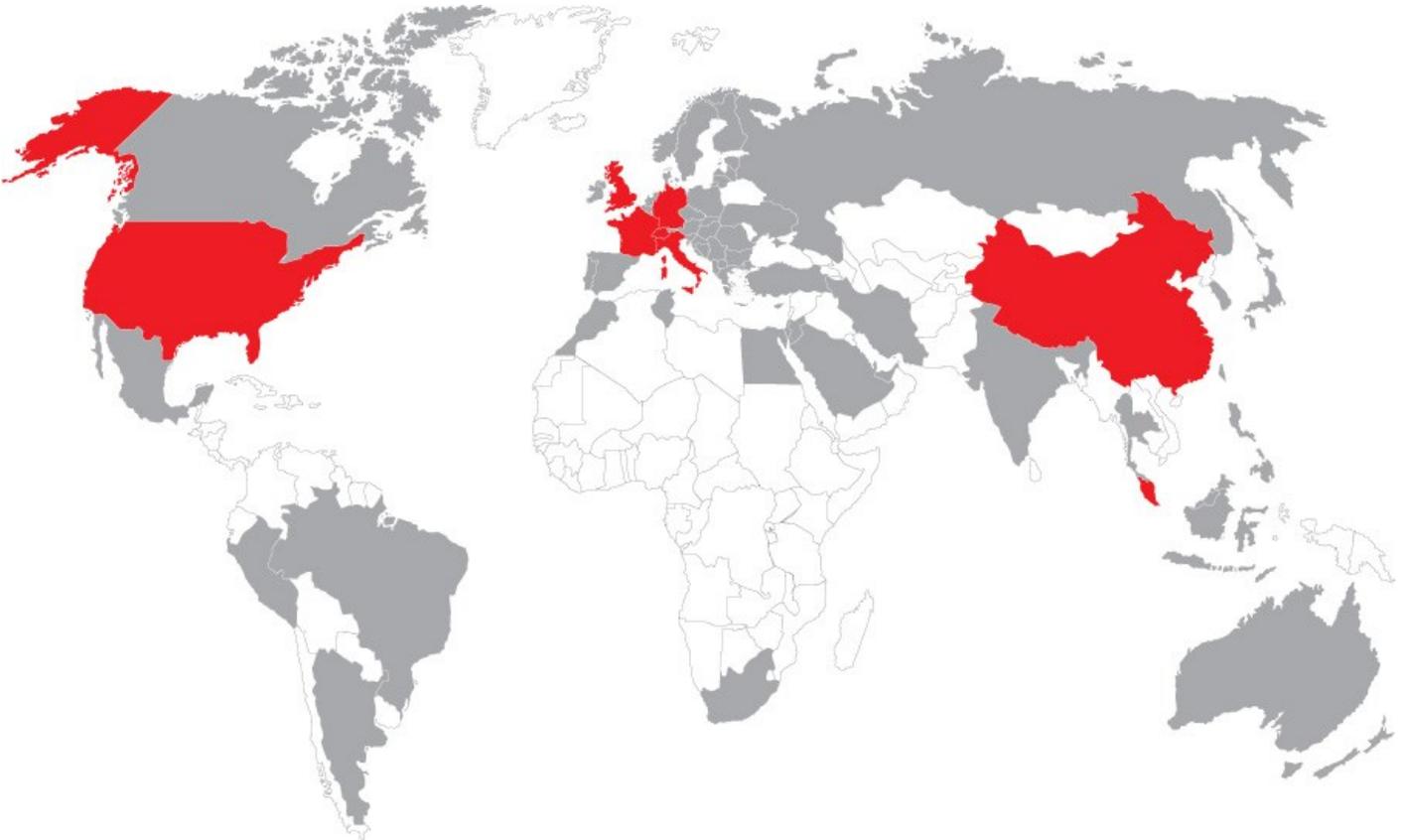
Thus, in reducing infectious disease transmission specific environmental control of temperature and humidity is required for Hospitals and healthcare premises.

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