Fighting flu with humidity

Tim Scott looks at how seasonal flu could be reduced with humidity control

The flu virus is responsible for thousands of deaths every year

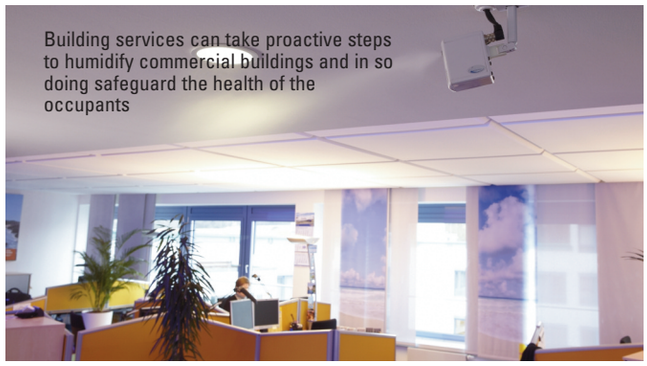
EVERY YEAR hundreds of thousands of people across the UK visit their doctor because of influenza and tens of thousands are hospitalised. It's estimated that on average around 8,000 deaths per year are attributable to the flu, with it costing the UK economy 7.6 million working days. With such a dramatic social and economic impact on the nation, could the building services industry be doing more to combat this problem?

As one of the main ways of catching the virus has been shown to be airborne transmission, the answer is definitely "yes", and the solution could be in the water content of the air we all share.

When an infected person breathes, speaks, coughs or sneezes, they release aerosolised droplets that contain elements including saliva, mucus, salts and virus particles. Large droplets fall to the ground or settle on surfaces but droplets less than 4microns in size have been shown to remain airborne for long periods of time. These droplets can travel throughout a building via its air conditioning system and be inhaled by others, allowing the virus to enter the upper respiratory tract where it can initiate an infection.

Many scientific studies have concluded that the moisture content of the air has a direct impact on the length of time the virus remains active and infectious within the airborne droplet. Using manikins that "coughed" influenza into an atmosphere, Noti et al (2013) showed that at a relative humidity of less than 40%, airborne viruses remained active and potentially infectious for much longer periods than when the humidity is above 40%. The study concluded that, "Maintaining indoor relative humidity at more than 40% will significantly reduce the infectivity of aerosolized virus", which in turn could greatly reduce the risk of people in the vicinity becoming infected.

The reason that the humidity has such an effect on the virus is due to the salt concentrations of the airborne droplets. Once released from an infected individual, the moist droplets rapidly lose their water content as they come into contact with the air. At a humidity of between 40-60% the droplets will lose around 90% of their weight due to moisture loss. The salt concentration of the droplet rises to a level that is toxic to the virus it contains and the virus cannot survive. It becomes "deactivated", greatly reducing the risk of transmission to other people in the area.



Building services can take proactive steps to humidify commercial buildings and in so doing safeguard the health of the occupants

However, at below 40%RH, the droplets lose so much moisture that the dissolved salts crystallize out and cease to be harmful to the suspended virus particles. This means the virus contained in the now dry airborne aerosol, remains active and infectious for longer, presenting a greater risk of transmission to other people.

The moisture content of the air not only has a direct effect on the airborne particle and the viruses it carries, it also affects our ability to protect ourselves from them, should we be unfortunate enough to inhale them while they are still infectious. Our nose and throat contain mucous membranes that naturally defend our bodies from contaminants in the air with breathe. Cells in the mucous membrane produce mucus and have tiny hair-like projections called cilia. Particles in the air we breathe are usually trapped by this sticky mucus and transported by the motion of the cilia towards the throat and away from our airways. This system helps clean the air before it enters the lungs.

However, in a room with low relative humidity below 40%RH, the mucus in our nose and throat dries out and this cleaning process is impaired, making us more susceptible to infection from airborne contaminants, including the flu virus.

In a recently published article in the Journal of Infection, Jane Metz and Adam Finn, of the University of Bristol, reviewed all the scientific evidence presented over the years associated with humidity and winter-time influenza peaks in temperate climates. They concluded that, "The prospect of reducing influenza-associated morbidity and mortality by increasing the absolute humidity in nurseries, classrooms, hospitals, homes for the elderly and general public spaces is an exciting and novel potential strategy for disarming flu."

So given the swell of research and evidence indicating that maintenance of indoor air humidity at between 40-60%RH in public places could reduce the impact flu has on our social health and economy, isn't it time the building services industry took proactive steps to humidify all of these places?

As humidification specialists, we work with many organisations that recognise the health benefits to staff of maintaining optimum humidity levels in the workplace. In protecting their staff from the dangers of low humidity, they are also improving their profitability through reduced absenteeism and enhanced worker health. However, these tend to be more affluent types of company, such as banks or large corporations.

It's a strange world we live in when lab rats are protected by EU Directives that state the air they breathe must be kept between 45-65%RH for their welfare, while the Department of Health, in its recommendations for healthcare premises, states that humidification of hospitals is not generally required and cite the expense of the plant and its running costs. What about the cost to patients' health or the consequential economic impact of having to treat more sick people due to enhanced airborne virus survival and transmission?

The level of 40-60%RH for indoor air conditioned spaces is a figure endorsed by HEVAC, CIBSE, BSRIA and BRE. Also, the HSE, in its Display Screen Equipment Regulations 1992, obliges UK employers to maintain an "adequate level" of relative humidity to prevent discomfort and problems of sore eyes for people working at computer terminals.

However, even with these recommendations in place, all too often people in offices and public premises suffer the consequences of dry air, as humidifiers are either turned off or not installed to save money. Unlike temperature, low humidity is not immediately perceivable and people fail to associate the detrimental effects of dry air with their poor health. But given the impact on the nation's well being and its pocket, the building services industry should be more aware of the consequences of low humidity, and be more conscientious in providing the recommended humidity levels for the benefit of the building occupants it's ultimately there to serve.

• The author is the head of sales at Condair plc

Tim Scott