

Is low indoor humidity a driver for healthcare-associated infections?

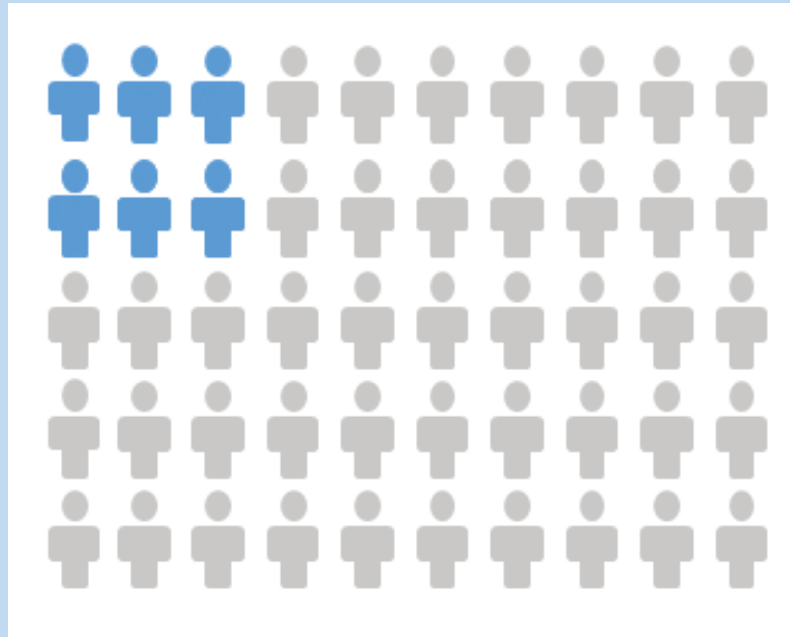
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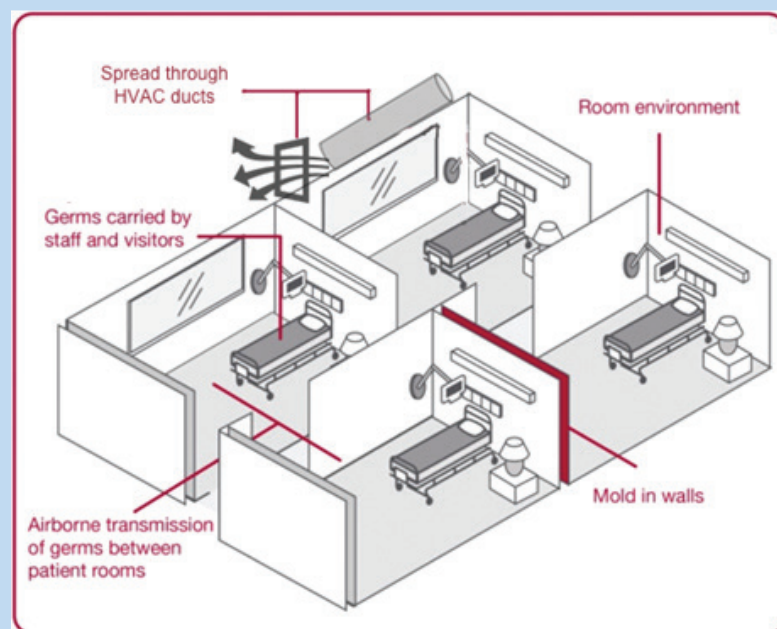
We go to the hospital to get healthy, but ...

more than
10% of
patients



are harmed
by new
infections
(HAIs) ...

We asked, "How does the built environment, especially indoor air management, influence transmission of infectious germs?"



Is low indoor humidity a driver for healthcare-associated infections?

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In the US and Europe, errors during in-patient medical care is the 6th leading cause of death (6). A significant portion of this terrible statistic are deaths due to new infections, called nosocomial or healthcare-associated infections (HAIs), that patients acquire while in the hospital. At least 10% of all patients who enter an inpatient healthcare facility for treatment will develop a HAI(2). Tragically, in the US alone, the number of deaths from these infections is over 100,000 annually. What are the environmental factors behind this situation and what more can we do to control the epidemic?

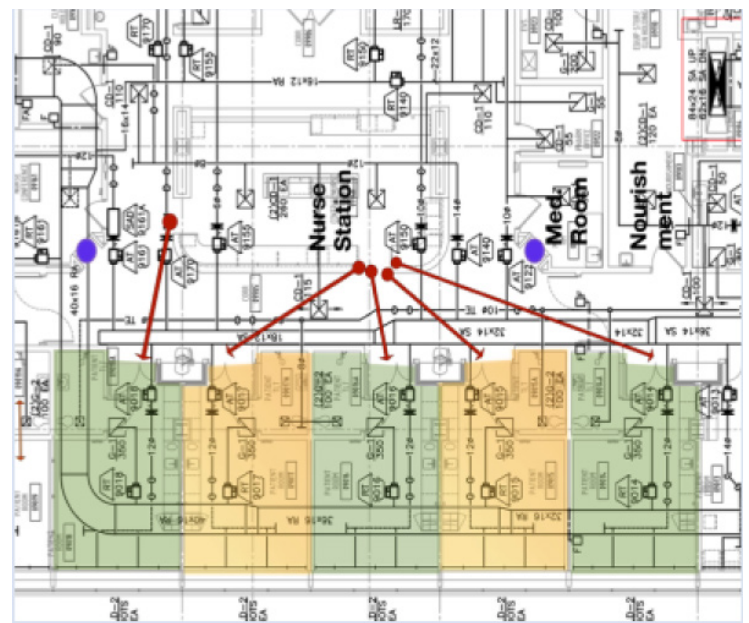
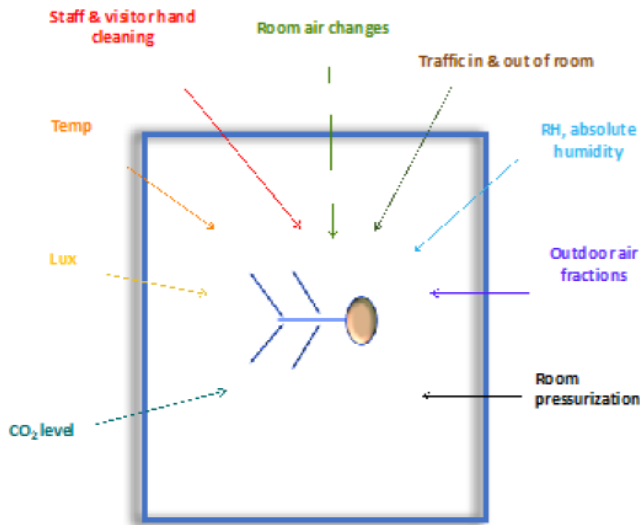
Our study: Indoor building environment and patient clinical outcomes

The Building

Ten patient rooms across two floors were studied for 12 months. Five rooms on one floor were for patients with acute medical or surgical conditions. Patients on the other floor were being treated for cancer and were more likely to have immune system deficiencies.

Patient Room Monitoring

Environmental parameters were measured every 5 minutes in the ten patient rooms, yielding several million data points over the year-long project.



Patient HAIs

Patient outcomes determined from de-identified records were related to room measurements. Multivariate statistical analysis with linear regression was then run to see if any building parameter was significantly related to new patient infections (HAIs). HAIs as shown here were found.

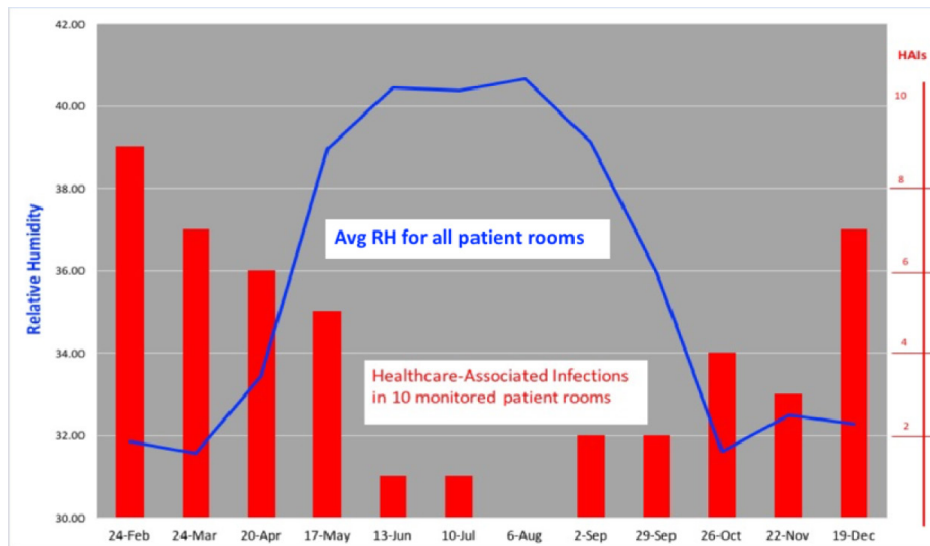
	Clinical symptoms	HAI Organisms
1	site of infection not specified	Citrobacter infection
6	colitis and diarrhea	Clostridium difficile
6	post-surgical wound infection	organism unspecified
2	pneumonia	Cytomegalovirus, Pseudomonas, Epstein-Barr virus
5	urosepsis	organism unspecified, e Coli
3	infection with joint prosthesis	MRSA
6	central line with blood stream infection	bacteria unspecified
4	pneumonia	organism unspecified
1	gastritis, enteritis	Cytomegalovirus, salmonella,
4	bacteremia	organism unspecified
2	pneumonia	MRSA

Patient HAIs were inversely associated with relative humidity (RH) as an independent variable in the respective patient care rooms.

RESULTS: Relative humidity below 40% is associated with an increased prevalence of patient HAIs.

ACKNOWLEDGEMENT

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Conclusion: Humidification offers an effective yet underutilized preventive measure against healthcare associated infections caused by both bacterial and viral infections. RH from 40% - 60% may provide patients a safer indoor environment.

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