

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

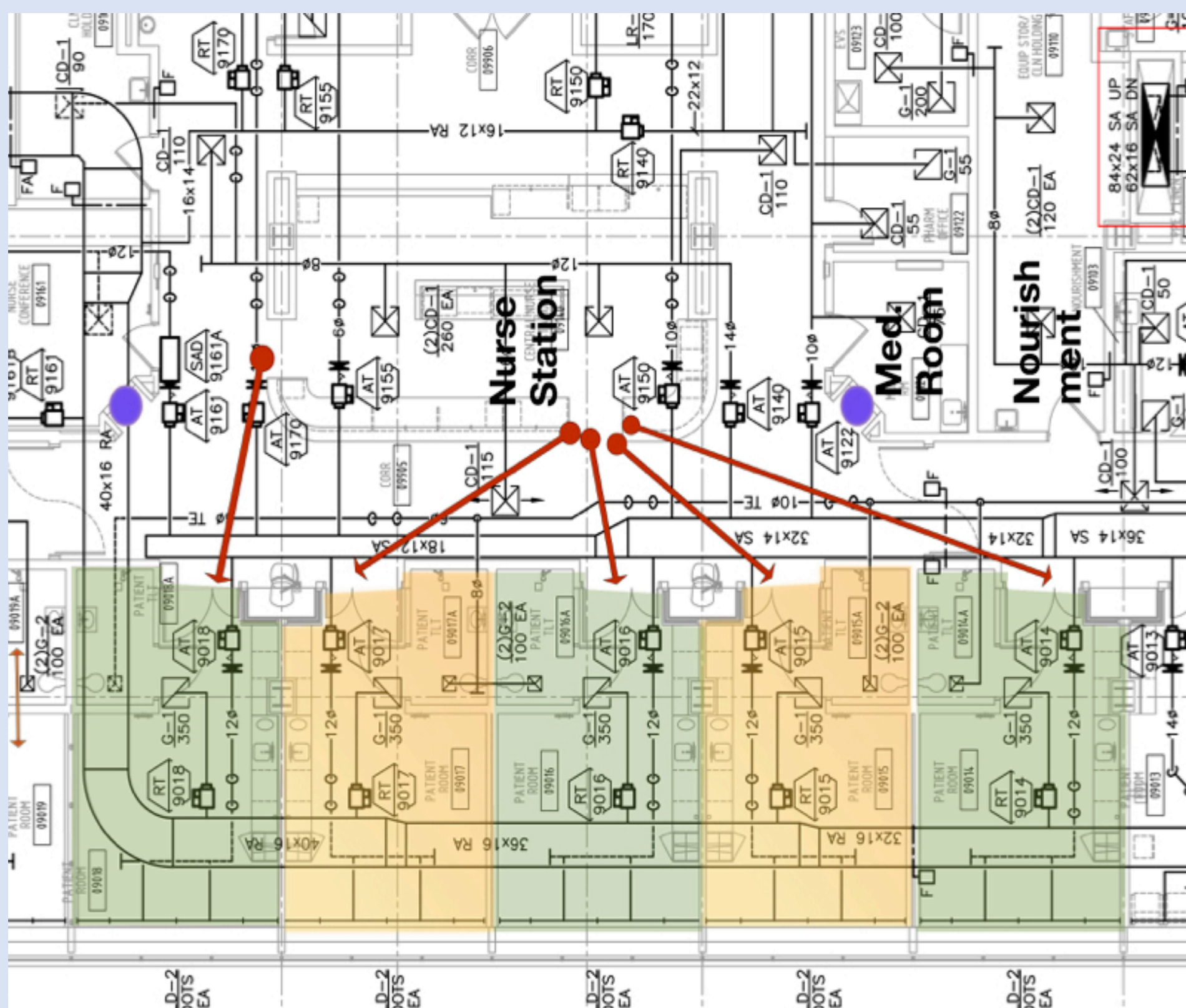
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In the US and Europe, errors during in-patient medical care is the 6th leading cause of death (6). A significant portion of this terrible statistic are deaths due to new infections, called nosocomial or healthcare-associated infections (HAIs), that 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

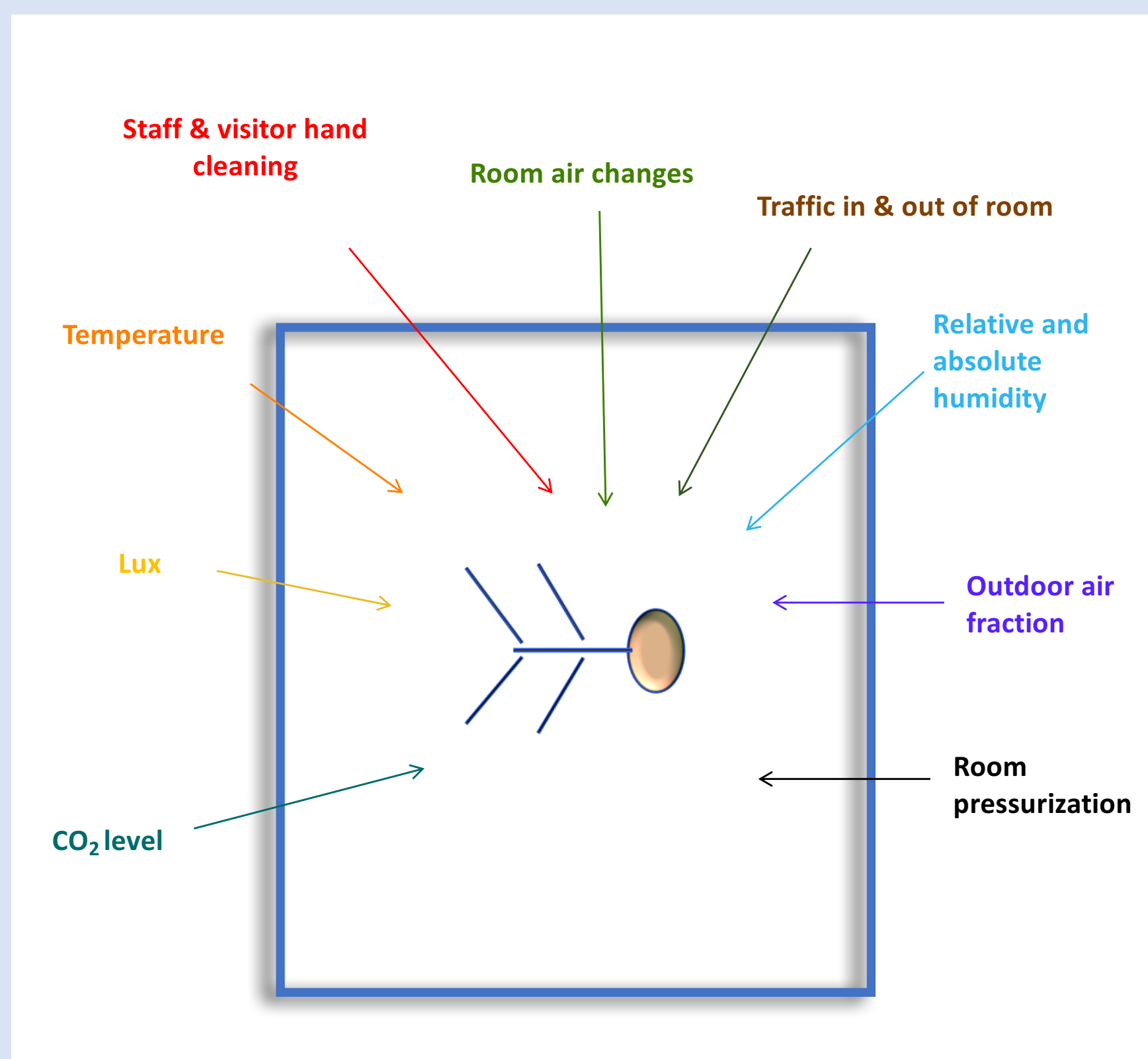
The building

Ten single patient rooms on two floors were monitored for 12 months. Five rooms on one floor were for patients with acute medical or surgical conditions and five rooms on the other floor were for oncology patients



Patient room monitoring

Environmental parameters were measured every five 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 conditions. Multivariate statistical analysis with linear regression was run to evaluate correlation between indoor measurements and new patient infections (HAIs). HAIs as shown below 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.

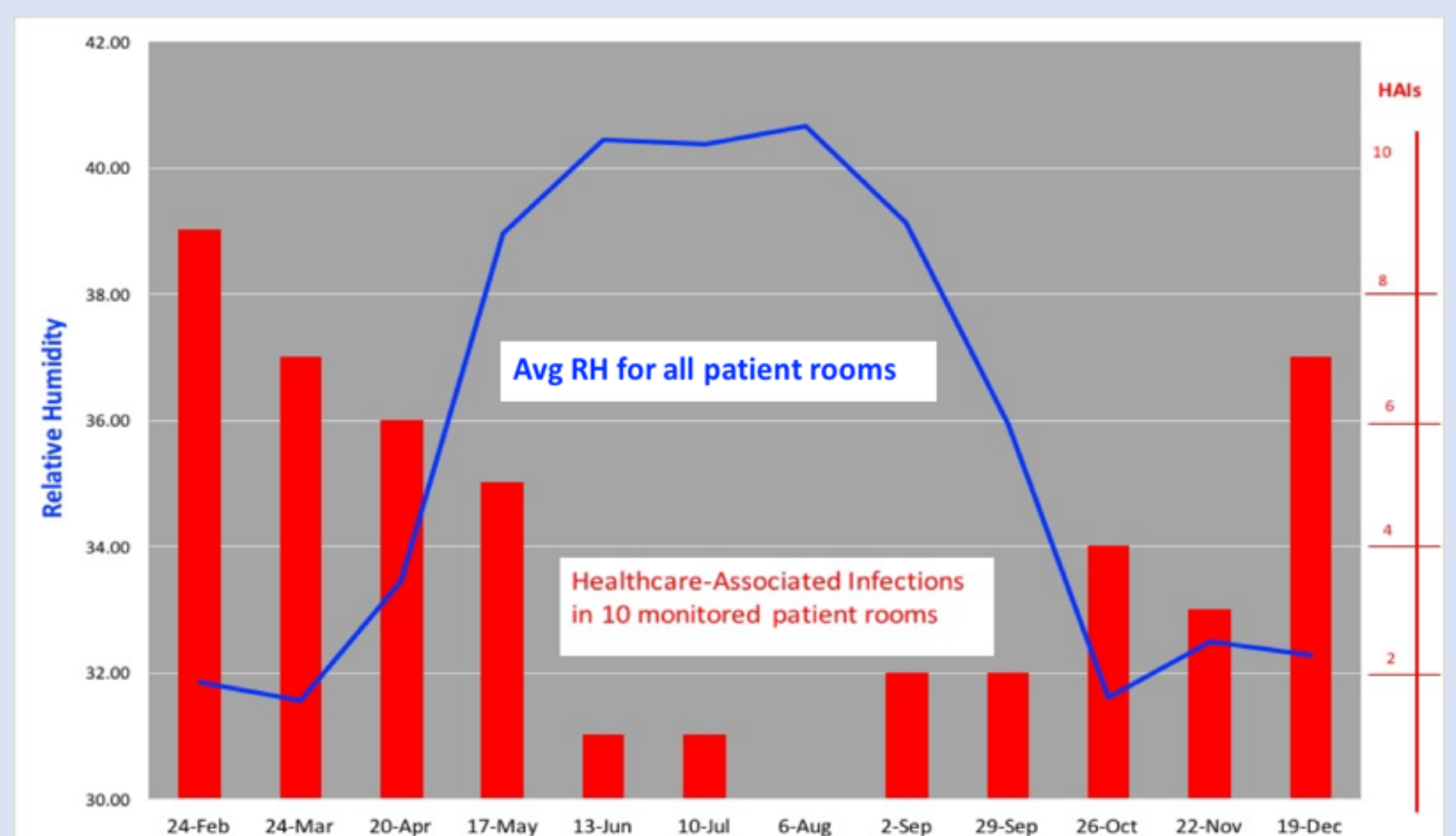
RESULTS: Low indoor air relative humidity was associated with more patient HAIs.

ACKNOWLEDGEMENT

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Multi-variant analysis with linear regression for relative humidity

P value < 0.02



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 a safer indoor environment for patients.

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