SYNOPSIS

# KEY POINT SUMMARY

## OBJECTIVES

This objective of this study was to estimate the impact of HVAC particle filters in controlling size-resolved infectious aerosols of the influenza virus in a hypothetical office space, and estimate the reduction of risk of transmission and the costs of using particle filters versus outdoor air ventilation.

## DESIGN IMPLICATIONS

For ventilation, the use of HVAC filters, MERV 13 and higher, may be considered.

# HVAC filtration for controlling infectious airborne disease transmission in indoor environments: Predicting risk reductions and operational costs

Azimi, P., & Stephens, B. 2013 | *Building and Environment*. Volume 70, Pages 150-160

## Key Concepts/Context

The airborne transmission of infectious pathogens in indoor environments is a matter of concern. The authors refer to different operational and design strategies being used in different buildings to control/limit the spread of these pathogens. This study investigated the use of particle filters in HVAC systems as a means of reducing such transmission in terms of feasibility and cost. The study found that HVAC filters were effective in reducing the transmission of infectious pathogens and were more cost-effective than outdoor air ventilation.

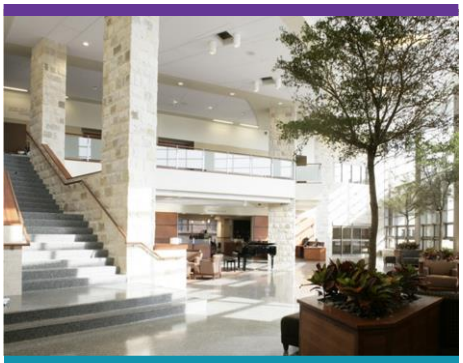
## Methods

The study uses a modified version of the Wells-Riley model to determine the reduction of risk of transmission of infectious aerosols and infectious particle deposition. The modified version included removal by recirculating HVAC filters and was linked with the Minimum Efficiency Reporting Value (MERV) classification of ASHRAE. The case study for this investigation was a hypothetical office building. The office space was about 500m2 in area, had 25 occupants, one of whom was infected with influenza.

## Findings

The study found that:

- The transmission of airborne infectious diseases could be reduced when recirculated air was filtered.



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- If a filter is not installed, then 15% of the occupants, that is, 4 of the 24 susceptible occupants, run the risk of getting infected; the absolute risk ranges from 12-21%.
- Installing a low-efficiency filter (MERV 7) reduces the risk to 12%.
- Installing a higher-efficiency filter (MERV 13) reduces the risk to 10%.
- Installing a high-efficiency filter (MERV 16) or a HEPA filter reduces the risk by 35-40% relative to the MERV 7 filter.
- The cost of filters would range from $112-$352 (low-efficiency to high-efficiency filters) per year in the hypothetical office. Fan energy costs would also increase from low- to high-efficiency filters; labor costs would decrease as number of replacements would decrease from low- to high-efficiency filters.
- The cost of outdoor air ventilation in four cities was determined and it varied from $367-$543.

## Limitations

The authors do not indicate any limitations to their study. Limitations of this study include its theoretical nature and its application in a hypothetical context.

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