



KEY POINT SUMMARY

OBJECTIVES

To develop a reproducible testing method for clinical assessment of air quality within OR spaces, and to evaluate quantifiable EQIs with measurable criteria.

Methodology for analyzing environmental quality indicators in a dynamic operating room environment

Gormley, T., Markel, T. A., Jones, H. W., Wagner, J., Greeley, D., Clarke, J. H., ... & Ostojic, J. 2017 | *American Journal of Infection Control*. Volume 45, Issue 4, Pages 354-359

Key Concepts/Context

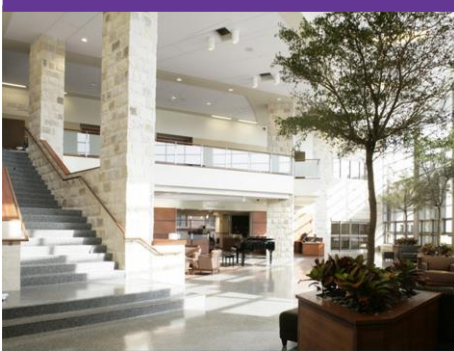
Operating rooms (ORs) provide space for delicate and complex medical procedures. This is why these spaces are closely monitored for cleanliness and efficiency. HVAC (heating, ventilation and air conditioning) are especially important features to optimize in these environments so that rates of surgical site infections may be reduced. For the purposes of this study, the authors developed the concept of Environmental Quality Indicators (EQIs), which measure microbial contaminants by colony forming units (CFUs) per cubic meter and particle counts by particles per cubic meter.

Methods

This study took place in three ORs within three hospitals over one weekend. ORs A and B were part of academic medical institutions, while OR C was part of a private community hospital. Throughout the study, microbial contamination and particle contamination were measured from operating tables and back tables where surgical instruments were prepared. Mock surgical procedures were performed in each OR, and mechanical experts were included in the process to help properly calibrate HVAC systems and measure air quality.

Findings

The authors found that their testing protocol for EQIs (measuring microbial and particle contamination in relation to air flow and temperature) provided consistently predictable results that allowed for the identification of differences in HVAC systems and room performances in various contexts. The authors suggest that the application of a performance metric like EQIs may be more effective for assessing healthcare spaces versus simply measuring ventilation rates. In sum, EQIs



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can effectively gauge air quality, overall room performance, and HVAC performance.

Limitations

The authors note several limitations within this study. Experiments were conducted during mock procedures, which may have resulted in somewhat skewed data. Physical layouts of all three ORs varied widely by size, HVAC usage, lighting, and other factors. Outdoor air conditions were also different at each site.

Design Implications

When gauging the efficacy of an HVAC system within a particular environment, the metrics proposed in this study (EQIs) may help better assess the efficacy of ventilation systems in reducing microbial and particle contamination in high risk areas. Healthcare designers could work with ventilation mechanics and other key stakeholders to ensure that HVAC systems are optimally designed and calibrated.

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