

## Ventilation of operating theatres requires a performance

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## Ventilation of Operating Theatres Requires a Performance

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**Background:** Due to infection risk, high demands are set for the air quality in operating theatres. As humans form the most important contamination source, ventilation of operating theatres is required. This is normally realised using a downflow plenum.

**Aim/Objective:** In this study a Performance Based (PB) approach was developed to allow testing of innovative ventilation design solutions for operating theatres. The paper describes the application of the approach, as well in the design stage as insitu, for an innovative downflow plenum that applies different temperature levels at the supply.

**Methods:** In the design stage the Computational Fluid Dynamics (CFD) technique was applied to evaluate the ventilation design. Evaluation was based on a performance requirement for the air quality, i.e. the contamination level above the operating and instrument tables should be lower than 10 CFU/m<sup>3</sup> (ultraclean).

Boundary conditions for the contamination sources have been proposed. In the use phase, the actually built ventilation system was evaluated in-situ, applying a similar procedure as for the design evaluation.

**Results:** Application of the procedure in the design stage showed that objective PB optimisation of a ventilation design for operating theatres is possible. Based on the results design changes were proposed and the improvement was verified.

Application of the procedure in-situ was also successful. The measurement results indicated the correct performance and the agreement with the design results.

**Discussion:** The developed PB approach showed to be useful and open for assessment of innovative solutions. However, the applied static reference situation may be less representative.

Also, the application of the CFD-technique brings in specific assumptions that may affect the result. Future work therefore will focus on the evaluation under more realistic conditions.

Furthermore, the PB approach is extended to, e.g., thermal comfort aspects, costs.