Light, heat and noise – the impact of operating theatre environmental factors on performance

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Introduction

Optimising surgical performance is critical for patient safety and clinical efficiency. Recent efforts have focused on individual-level factors (eg stress-management, situation-awareness) and team factors (eg communication, leadership). However, the influence of environmental conditions within the operating theatre remains underexplored. These include lighting, temperature, humidity, noise and music.

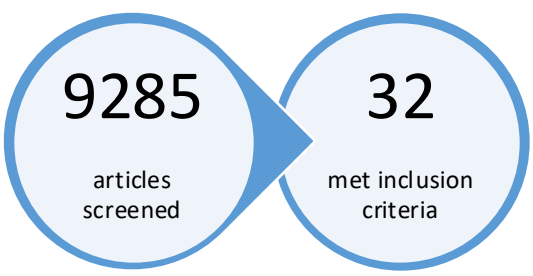
Objectives

The aims of this systematic review were to examine the variation of five environmental factors (lighting, noise, temperature, humidity, music) in operating theatres, and to evaluate the range and impact of environmental factors on the performance of operative team members.

Methods

A systematic review was conducted using EMBASE, Medline, Pubmed and CENTRAL for studies examining the impact of lighting, temperature, humidity, noise and music on the performance of surgical teams. Outcomes assessed include operative skills, cognitive workload, and patient outcomes that may be a proxy for operative performance. The QuADS score was used for quality assessment of the included papers.

Results



Increased illumination reduced tiredness in some participants, but limited research and variable results

Increased temperature was associated with less comfort, but not reduced technical or cognitive performance

Noise regularly exceeded recommended standards and was associated with increased mental workload and incidence of complications

Although music increased decibels it was viewed positively by participants, despite not objectively enhancing performance

Mean QuADS score of 24 out of 39, with a median score of 22

Conclusions

Noise consistently exceeds recommended thresholds and is linked to increased cognitive load and complications. In contrast, temperature is individual-specific and may require compromise between team members. Given the paucity of research on lighting, more investigation is warranted. Surgeons should consider modifiable environmental factors as part of a systems approach to optimising operative performance, patient safety, and staff-wellbeing.