

Indoor Environment Quality in a Dental Facility – Assessment of Indoor Air Quality, Lighting, and Noise

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Objectives

Indoor environmental quality (IEQ) is a term that refers to the quality of a building's environment in relation to the health and wellbeing of the building's occupants. Workers in a dental facility are faced with competing priorities between patient comfort and exposures to IEQ components that have may have a detrimental effect on their health. The aim of this study was to measure exposures of staff in a dental facility to indoor air contaminants, noise, and lighting; and to determine whether these exposures were within the recommended exposure guidelines or below exposure standards.

Methods

Exposure monitoring was undertaken in a dental facility in Darwin, Australia. Measurements of indoor air quality (IAQ), sound levels and lighting were taken in 3 different work areas (dental surgery, sterilisation room and laboratory). A Yes Air Plus monitor was used to measure for temperature, relative humidity, NO₂, CH₂O, NO, O₃, CO₂ and TVOC. Bruel and Kjaer 4448 Personal noise dosimeters were used for the duration of a work shift for 5 workers. Noise measurements for specific activities were taken using a Bruel and Kjaer 2245 Sound Level Meter. Lighting measurements were taken according to AS/NZS 1680.1:2006 using an Extech HD450 Datalogging Light Meter.

Results

IAQ results revealed exposure to TVOC exceeded the maximum exposure level set by the Australian Building Codes Board for the sterilisation room. Noise monitoring results demonstrated that exposures over 8 hours did not exceed the exposure standard set by Safe Work Australia of 85 dBA when using personal noise dosimetry. Several of the static noise measurements identified a variance/tonality of > 5 dB between frequencies in the low frequency range. Lighting levels measured were above the recommended maintained illuminances from AS/NZS 1680.1:2006.

Conclusions and Recommendations

Despite observed noise exposures being under the exposures standard of 85 dBA, this standard is usually associated with noise induced hearing loss (NIHL). Exposure to noise at lower levels but in environments containing varying levels of background noise have been previously associated with communication difficulties and fatigue due to speech intelligibility, as well as an increase in reported annoyance and stress. Further research should be undertaken to determine worker satisfaction and reported stress in relation to exposure to tonality of sounds. It is recommended that the dental facility utilise acoustic controls including sound absorption. Further research is recommended to compare measured exposures of a combination of IEQ parameters with workers reported perception, symptoms and stress relating to the workplace indoor environment.

Keywords

Dental, indoor environment quality, noise, speech intelligibility