



## **Volatile organic compounds in healthcare facilities – A study developed in Primary Health Care Centers in Lisbon, Portugal**

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Chemical contamination is a reality in healthcare environment, but unfortunately is rarely studied. However, if we consider that healthcare workers use a high diversity of products such as disinfectants, sterilizers, anesthetic gases, and much other, it is easy to recognize that workers and patients can be exposed to a complex mixture of chemicals.

The aim of this study was to evaluate the presence of volatile organic compounds (VOCs) in Primary Health Care Centers (PHCC) located in Lisbon.

Measurements of VOCs were performed in indoor (Medical office, Technical office, Back office, Front office, Vaccination room, Treatment room, Warehouse/Cleaning room, Canteen, Sterilization area and Oral hygiene office) and outdoor premises of 10 PHCC, with portable direct-reading equipment (Graywolf equipment, with photoionization detector sensor). Additionally, and as an indicator of ventilation quality, carbon dioxide (CO<sub>2</sub>) was also measured with the same equipment. The dataset obtained was analyzed in the statistical software SPSS for Windows, v23.0.

VOCs results ranged from 0 to 5 ppm and the treatment room was found to have the highest concentrations, followed by the laundry room. Statistically significant differences were obtained between PHCC ( $p=0.000$ ) and a significant correlation in a positive direction was observed between VOCs and CO<sub>2</sub> concentrations ( $p = 0.000$ ).

Results showed that VOCs are present in PHCC probably due to healthcare tasks (treatment room) and cleaning activities (laundry) that imply the frequent use of disinfectants and cleaning agents. Additionally, and considering the correlation obtained with CO<sub>2</sub>, poor ventilation conditions are probably promoting the high concentrations obtained.

Actions should be developed to substitute the products used (e.g. less volatile for instance) and to increase the ventilation rates particularly in the areas where chemical products are used more intensively.

Future research work must be developed to identify the VOCs in presence and to estimate the health effects that can be related with this exposure.

**Keywords:** volatile organic compounds, healthcare facilities, ventilation rates.

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