

Volatile organic compounds in healthcare facilities – A study developed in primary health care centers in Lisbon, Portugal

S. Viegas^{1,2}; B. Almeida^{1,3}; C. Gamelas³; E. Carolino¹; C. Viegas^{1,2}

¹H&TRC- Health & Technology Research Center, ESTeSL- Escola Superior de Tecnologia da Saúde, Instituto Politécnico de Lisboa; ²Centro de Investigação e Estudos em Saúde Pública, Escola Nacional de Saúde Pública, ENSP, Universidade Nova de Lisboa, Lisbon, Portugal; ³ESTSetúbal-Escola Superior de Tecnologia de Setúbal, Instituto Politécnico de Setúbal.

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 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 photo ionization detector sensor). Additionally, and as an indicator of ventilation quality, carbon dioxide (CO₂) 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 rooms were found to have the highest concentrations, followed by the cleaning rooms. Statistically significant differences were obtained between PHCC ($\chi^2(K-W)(9)=15611.855$, $p=0.000$) and a significant correlation in a positive direction was observed between VOCs and CO₂ concentrations ($rS = 0.513$, $p=0.000$).

Results showed that VOCs are present in PHCC probably due to healthcare tasks (treatment room) and cleaning activities (cleaning room) that imply the frequent use of disinfectants and cleaning agents. Additionally, and considering the correlation obtained with CO₂, poor ventilation conditions are probably promoting the high concentrations obtained. Actions should be developed to substitute the products used (e.g. less volatile) 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.

The authors are grateful to FCT – Fundação para Ciência e Tecnologia for funding the project EXPOsE – Establishing protocols to assess occupational exposure to microbio-ta in clinical settings (02/SAICT/2016 – Project n° 23222).