Preventing exposure to cytotoxic drugs by analysing cyclophosphamide residues in the manipulation areas of a northern Portuguese hospital

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Abstract

The manipulation of cytotoxic agents has been increasing as chemotherapy remains the first line treatment for several malignant diseases of growing incidence. However, cytotoxic agents such as cyclophosphamide do not specifically target cancer cells, being therefore able to harm the professionals that prepare them. To prevent occupational exposure, an adequate monitoring of the working environment is warranted. The present study aimed at validating an analytical method for the evaluation of the presence of cyclophosphamide in the surface of three different rooms of a northern Portuguese hospital, in which cytotoxic drugs are received or manipulated. The extraction procedure consisted of wiping with a 100cm2 gauze moistened with ethyl-acetate followed by mixing with 15mL methanol: acetonitrile: water (25:10:65) and filtration with a PTFE 0.2µm filter. The samples were then analysed by HPLC-DAD (205nm), with the separation being obtained with a C18 column. The analytical method was validated regarding linearity, intra-day (92-98%) and inter-day (91-98%) precision, accuracy (80-106%), recovery (97-114%) and sensibility (LOD = 0.089 µg/cm2; LOQ = 0.269 µg/cm2). A total of 50 real samples were analysed and all of them presented values below the LOD. Despite using analytical methods with lower sensibility than the one herein presented, previous published studies about the presence of cytotoxic drugs on surfaces of other Portuguese hospitals revealed severe contamination in the manipulation areas. These negative results likely indicate that in this hospital the preparation protocols efficiently limit exposure, further evidencing the importance of complying with the guidelines. By adopting these procedures, it is possible to eliminate or at least greatly limit the occupational exposure to cytotoxic drugs, by nurses, pharmacy technicians and pharmaceutics. Analytical tools that efficiently monitor contamination are a helpful tool to monitor and prevent hazardous exposure.