Evaluation of surface contamination with antineoplastic drugs in preparation and administration areas in Polish hospitals

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INTRODUCTION

Occupational exposure to antineoplastic drugs of hospital personnel involved in their preparation and administration is a very important issue. However, there is a lack of knowledge of contamination levels on surfaces in Polish hospitals and pharmacies where antineoplastic drugs are handled. No studies so far have evaluated the surface contamination with these hazardous pharmaceuticals in Poland.

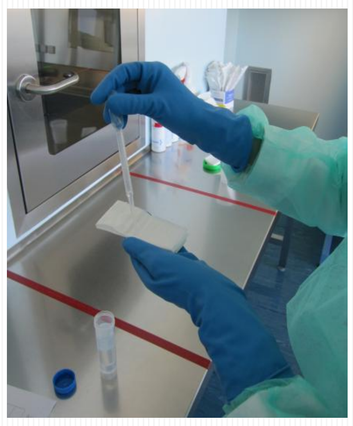
OBJECTIVES

The purpose of the study was to evaluate the environmental contamination with 8 antineoplastic drugs in 4 Polish hospitals at various sites, including drug preparation (pharmacy) and administration areas (oncology ward)

MATERIALS AND METHODS

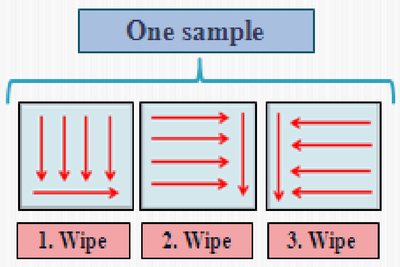
Wipe samples were taken from 5 comparable surfaces in the pharmacy (workbench inside of biological safety cabinet (BSC), floor in front of BSC, checking counter in preparation and outside preparation room, refrigerator door) and 5 similar surfaces on the ward (checking counter at nurses' station, lid of cytotoxic waste container, top of patient armchair, floor under the drip infusion stand, phone). All wipe samples were taken by the same person according to developed instruction.

The samples were analyzed using LC-MS/MS for contaminations with *cyclophosphamide, docetaxel, etoposide, 5-fluorouracil, gemcitabine, ifosfamide, methotrexate, paclitaxel.*

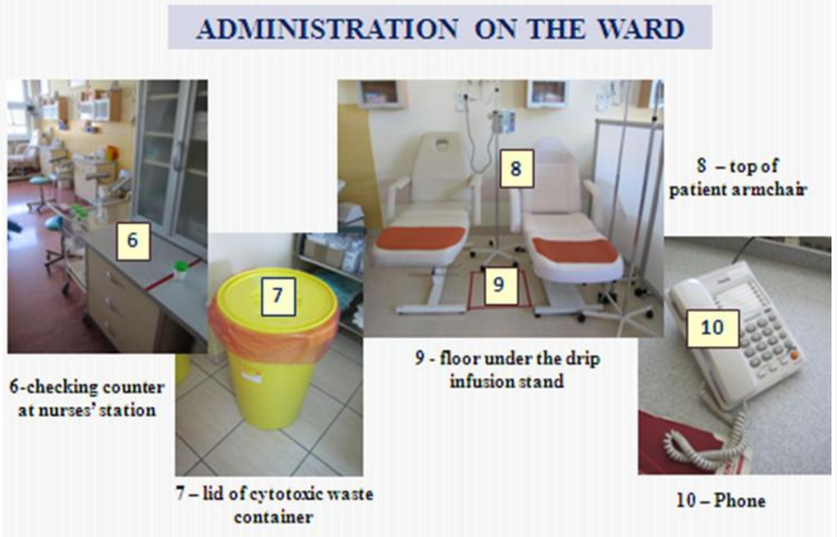


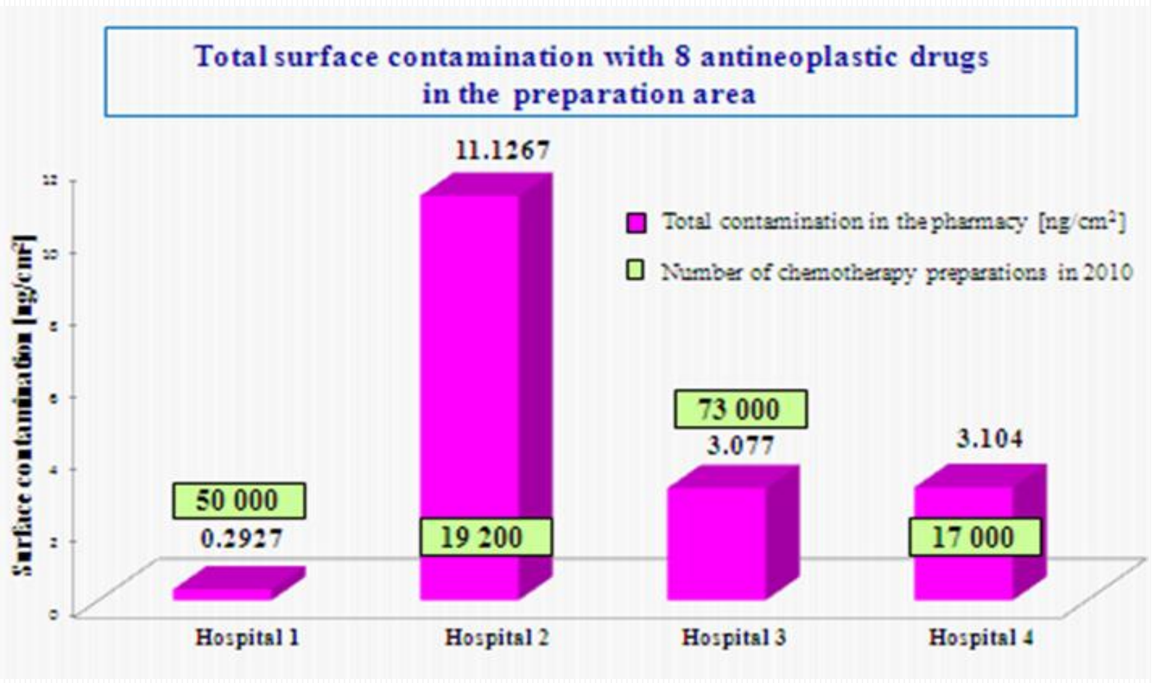
1 – work surface of BSC*, 2 – floor in front of BSC, 3- checking counter, 4 – checking counter outside the preparation room, 5 - refrigerator door

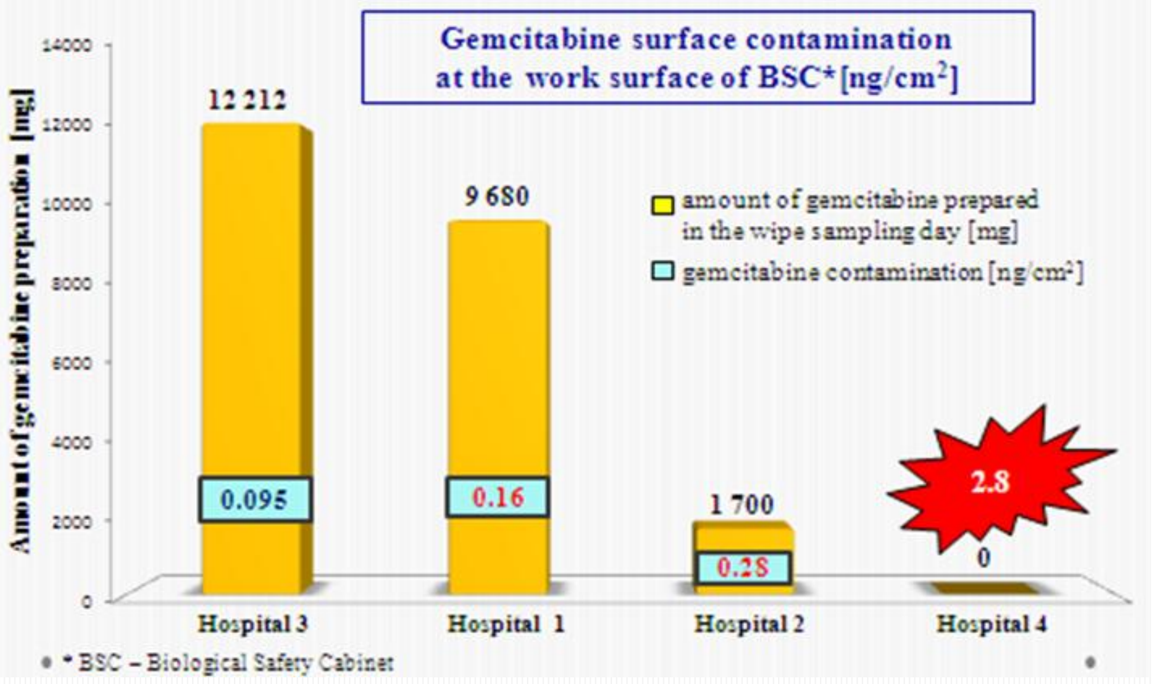
*BSC – Biological Safety Cabinet



Total surface area for each sampling location did not exceed 2500 cm²







RESULTS AND DISCUSSION

37 from 40 sampled surfaces were contaminated with at least one substance (92%).The most contaminated surfaces in preparation areas: workbenches in BSC (total: 8.21 ng/cm²), floors (5.43 ng/cm²), checking counters (3.63 ng/cm²). The administration areas with the highest total contamination: floors (145 ng/cm²), top of patient armchairs (10.76 ng/cm²) and phones (3.71 ng/cm²).

Two pharmacies with the highest number of drug preparations had significantly less cytotoxic drug contaminations than the other pharmacies. The most commonly surface contamination in all pharmacies were identified with gemcitabine (on 80% surfaces) but with the highest concentration of ifosfamide. 25 surfaces (17 in 4 wards; 8 in 2 pharmacies) were contaminated with drugs which were not used at the sampling day. These old contaminations show that beside the preparation procedures especially the cleaning procedures must be improved.

CONCLUSION

Measurable amounts of at least one agent were detected on almost all of the sampled surfaces in preparation and administration areas in all investigated hospitals. The level of surface contamination was significantly higher in the wards than in the pharmacies.