

# ANALYSIS OF ANTINEOPLASTIC DRUG CONTAMINATION LEVEL IN THE HOSPITAL PHARMACY: PROBLEM MONITORING AND SOLVING

V. Garau<sup>1</sup>, S.G. Gheza<sup>1</sup>, S. Colombo<sup>1</sup>, S. Cadelano<sup>1</sup>, M. Tulli<sup>2</sup>, G. Marcias<sup>2</sup>, P. Serra<sup>1</sup>.

1. ARNAS G. Brotzu, A. Businco Oncology Hospital, Hospital Pharmacy, Cagliari, Italy. 2. ARNAS G. Brotzu, A. Businco Oncology Hospital, Hospital Prevention and Protection service, Cagliari, Italy.

## BACKGROUND

Handling of antineoplastic agents pose major health risks to healthcare workers. Besides pharmacists, nurses, physicians, staff involved in cleaning, transport, and disposal of hazardous drugs or contaminated material are concerned. Environmental and personal monitoring can be applied to investigate exposure levels to antineoplastic drugs and to develop corrective actions.

## AIM AND OBJECTIVES

In the environmental context of the hospital pharmacy division, the aims of this work were:

- to evaluate the occupational exposure of healthcare workers to antineoplastic drugs;
- to measure environmental and personal contamination during preparation and laboratory activities;
- to evaluate the effectiveness of the decontamination procedures in the preparation rooms.

## MATERIALS AND METHODS

Personal exposure monitoring involved a total of 9 nurses and 2 pharmacists. Urine levels of cyclophosphamide (CP), gemcitabine and urinary metabolite 5-fluorouracil (5-FU), alpha-fluoro-beta-alanine (FBAL) were measured at the end of the work shift by using an ultra-high performance liquid chromatograph coupled to a triple quadrupole mass spectrometer (UHPLC-MS/MS; LOD: CP <0.1; 5-FBAL < 1.0; gemcitabine < 0.2). Additionally, at the beginning and end of the shift an environmental monitoring program was carried out using the WIPE-test and PAD-test techniques for the determination of 5-FU and CP on the surfaces inside and adjacent to the set-up area and on the operators, respectively.

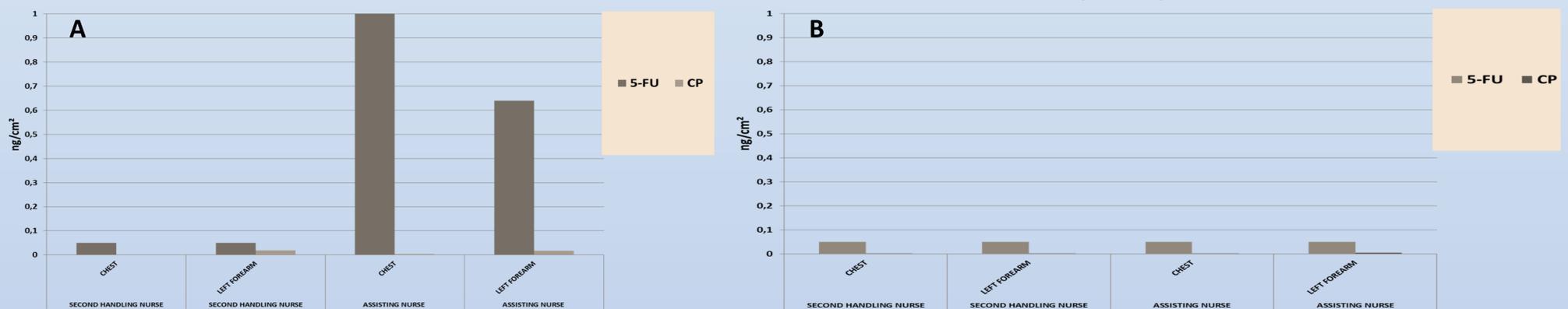


Figure 1. Employees sampling (pad test) before (A) and (B) corrective actions.

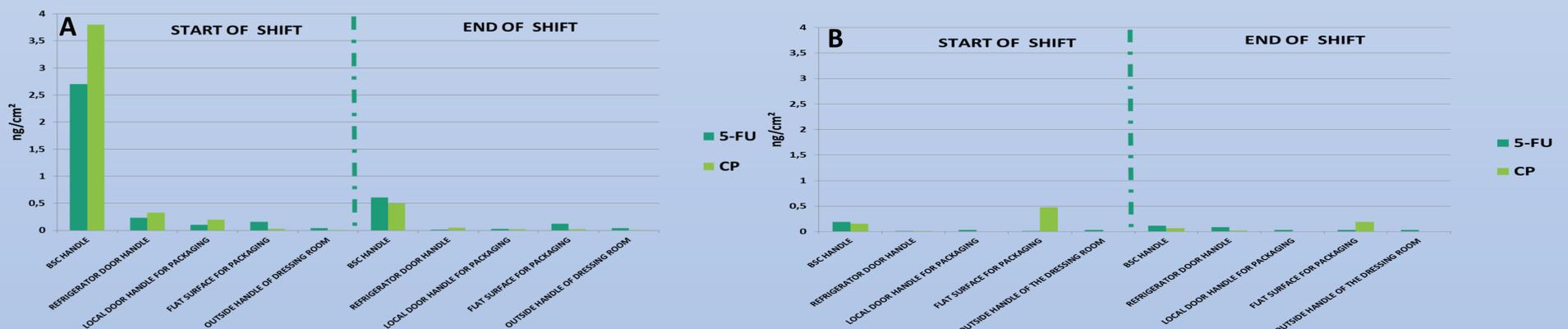


Figure 2. Environmental sampling (wipe test) before (A) and after (B) corrective actions.

## RESULTS

Urinary levels of antineoplastic drug metabolites were below their respective limits of determination (LODs). After corrective actions drug levels contamination measured by WIPE test were found lower, this is evident on the external handle of the laminar flow hood (Figure 2) The analytical results collected by PAD-test showed levels of 5-FU lower than the LOD and the presence of trace levels of CP on the preparer. On the other hand, a significant contamination by 5-FU was detected on the chest and forearm of the assisting nurse before putting into corrective practices.

## CONCLUSIONS

This study highlighted an environmental contamination of the preparation room with a low exposure of operators limited to the working area of preparation laboratory. On the other side, higher contamination levels were found on laboratory surfaces and on an assisting nurse. Furthermore, an improper moving by the nurses of a contaminated drug basket to a clean zone was found as a contamination critical point. This assessment allowed to review and efficiently update our decontamination procedures. After a further environmental control, an important reduction in the levels of environmental and personal contamination was measured. Tightly monitoring schedules of surfaces, exposure of workers and specific training courses of the cleaning personnel were proposed.

## Reference.

- Sottani, C., Grignani, E., Oddone, E., Dezza, B., Negri, S., Villani, S., & Cottica, D. (2017). Monitoring surface contamination by antineoplastic drugs in Italian hospitals: performance-based hygienic guidance values (HGVs) project. *Annals of work exposures and health*, 61(8), 994-1002.
- Sara Negri et al. Validation of cleaning procedures used in an Italian Hospital Pharmacy for antineoplastic drug decontamination: a new tool for industrial hygiene. *Med Lav*. 19 aprile 2019; 110 (2): 93-101. doi: 10.23749 / mdl.v110i2.8001.