

Pilot study of biological monitoring of four antineoplastic drugs among Canadian healthcare workers

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BACKGROUND

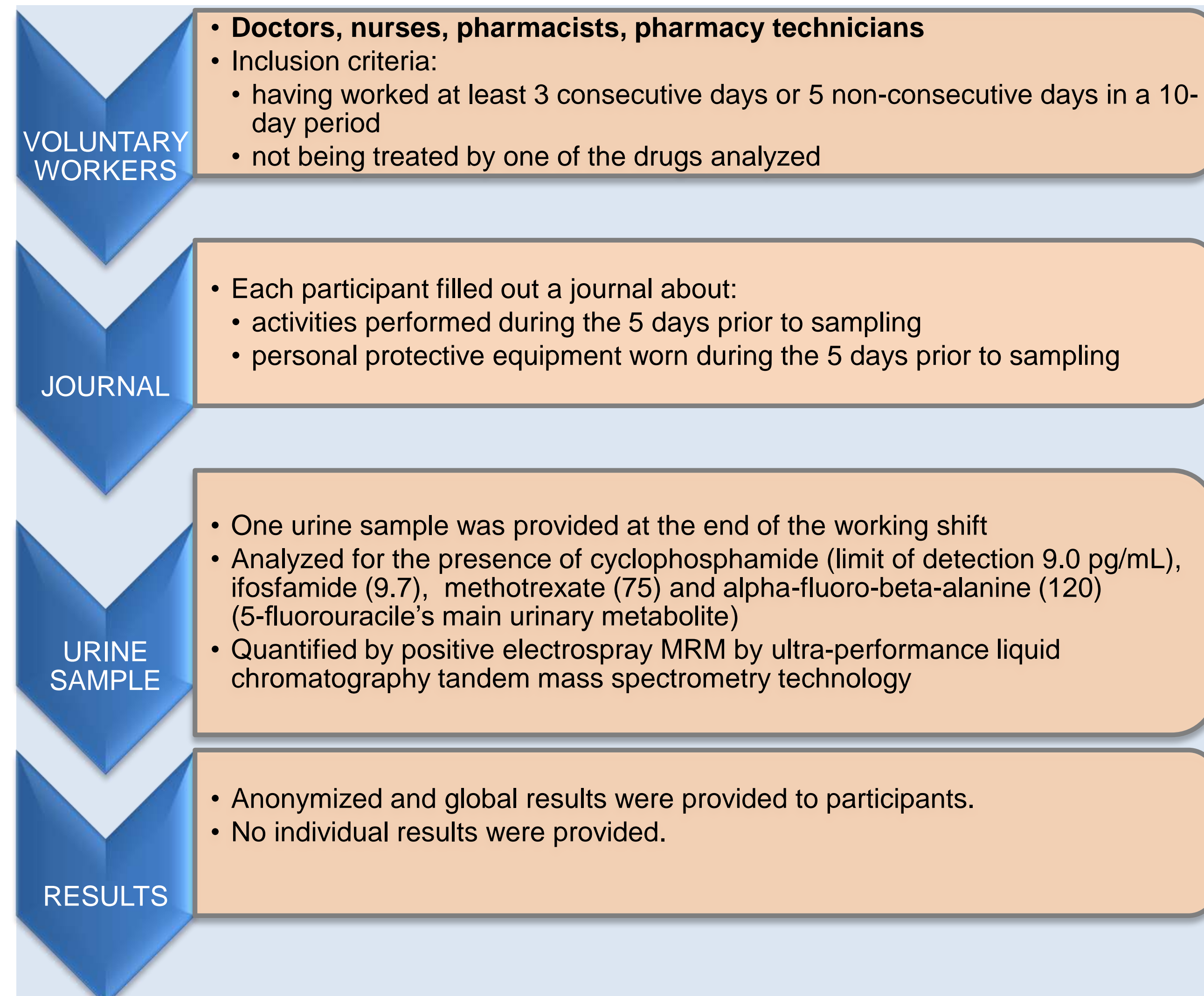
- Antineoplastic drugs represent the majority of the 2014 National Institute for Occupational Safety and Health list of hazardous drugs (97/184).
- Many surfaces in healthcare centers are known to be contaminated with traces of antineoplastic drugs. Workers occupationally exposed to them are at health risks. There is no safe exposure limit.

OBJECTIVES

- We hypothesized that implementing a biological monitoring program would be feasible and would allow the identification of activities related to a risk of exposure.
- The goal is to present the results of our pilot cross-sectional study of biological monitoring of four antineoplastic drugs in the urine of Canadian healthcare workers: cyclophosphamide, ifosfamide, methotrexate and 5-fluorouracil.

MATERIAL AND METHODS

- Exposed workers were recruited from an hematology-oncology department and control workers were recruited from a central pharmacy, in a mother-child university health center in Quebec, Canada.
- The department had one satellite pharmacy with two class IIB2 hoods for hazardous drugs preparations. No closed-system drug transfer devices was used.
- The study was preceded by an information period during which we aimed at enhancing the workers' awareness and knowledge of the risk of occupational exposure.



RESULTS

POPULATION

- Samples were collected between January 15, 2015 and January 29, 2015.
- The participation rate was 85.7% (102/119).
- One sample was excluded because of a doubt about cold chain maintenance

Table 1 Population

		Participants working in hematology-oncology (n=92)	Controls working in central pharmacy (n=9)
Job	Nurses	74	0
	Pharmacists	5	6
	Pharmacy technicians	6	3
	Doctors	7	0
Sex	Women	76	6
	Men	16	3
Age (years)	20-29	41	1
	30-39	22	4
	40-49	14	4
	≥ 50	9	0
	Not available	6	0

URINE SAMPLES

- No urine samples showed detectable concentrations for the four drugs evaluated (0/101; 0/74 nurses, 0/11 pharmacists, 0/9 pharmacy technicians and 0/7 doctors).

ACTIVITIES

- In the five days before sampling, 67/92 (72.8%) hematology-oncology participants performed at least one activity with antineoplastic drugs.
- No accidental exposure was reported during the study.

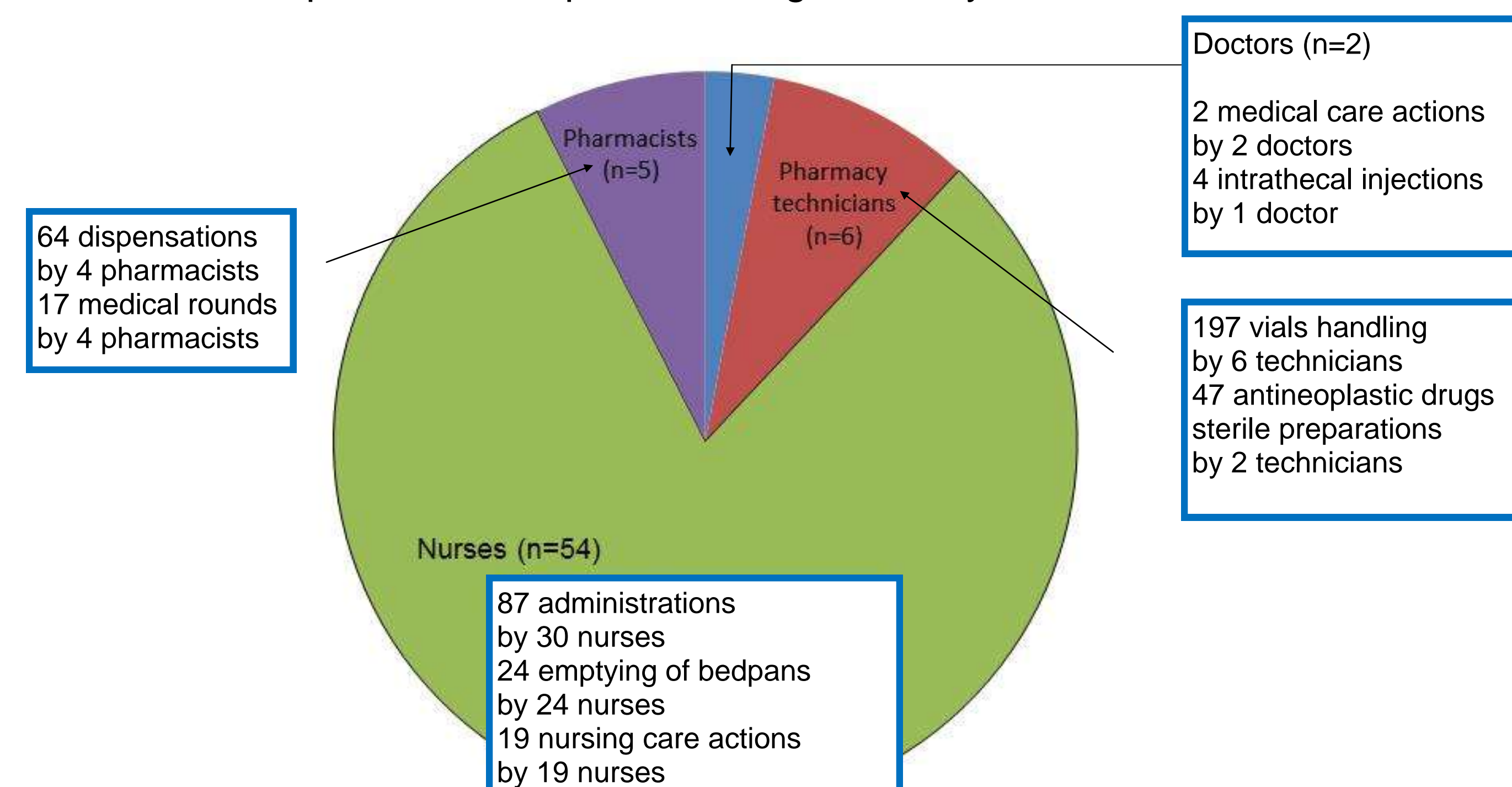


Figure 1 Activities performed before sampling. (3-5 days before sampling)

PERSONAL PROTECTIVE EQUIPMENTS

- Nurses wore all of the recommended protection for technical activities (86.2%), but rarely for non technical activities (14.9%).

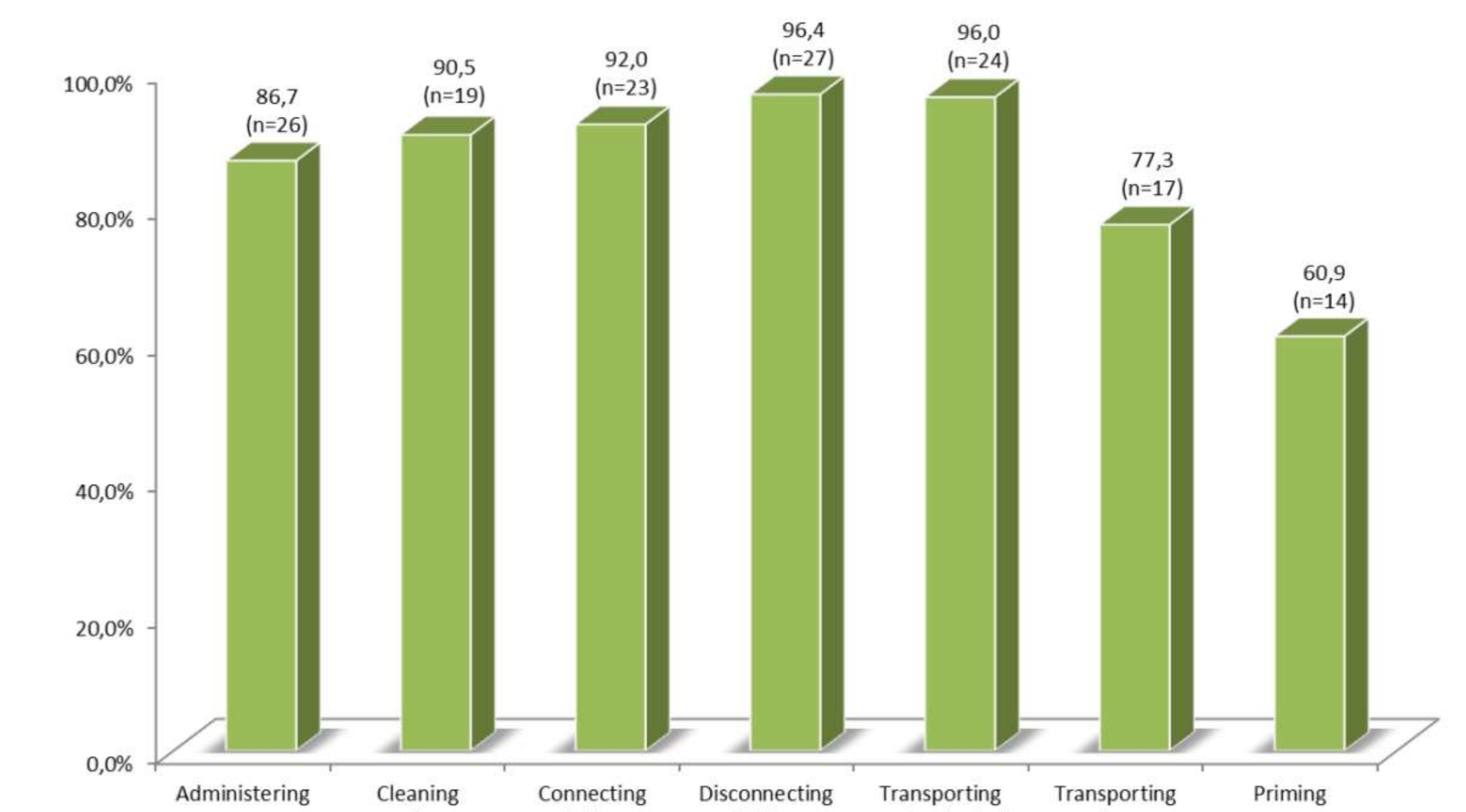


Figure 2 Proportion of nurses wearing full protective equipment for technical activities

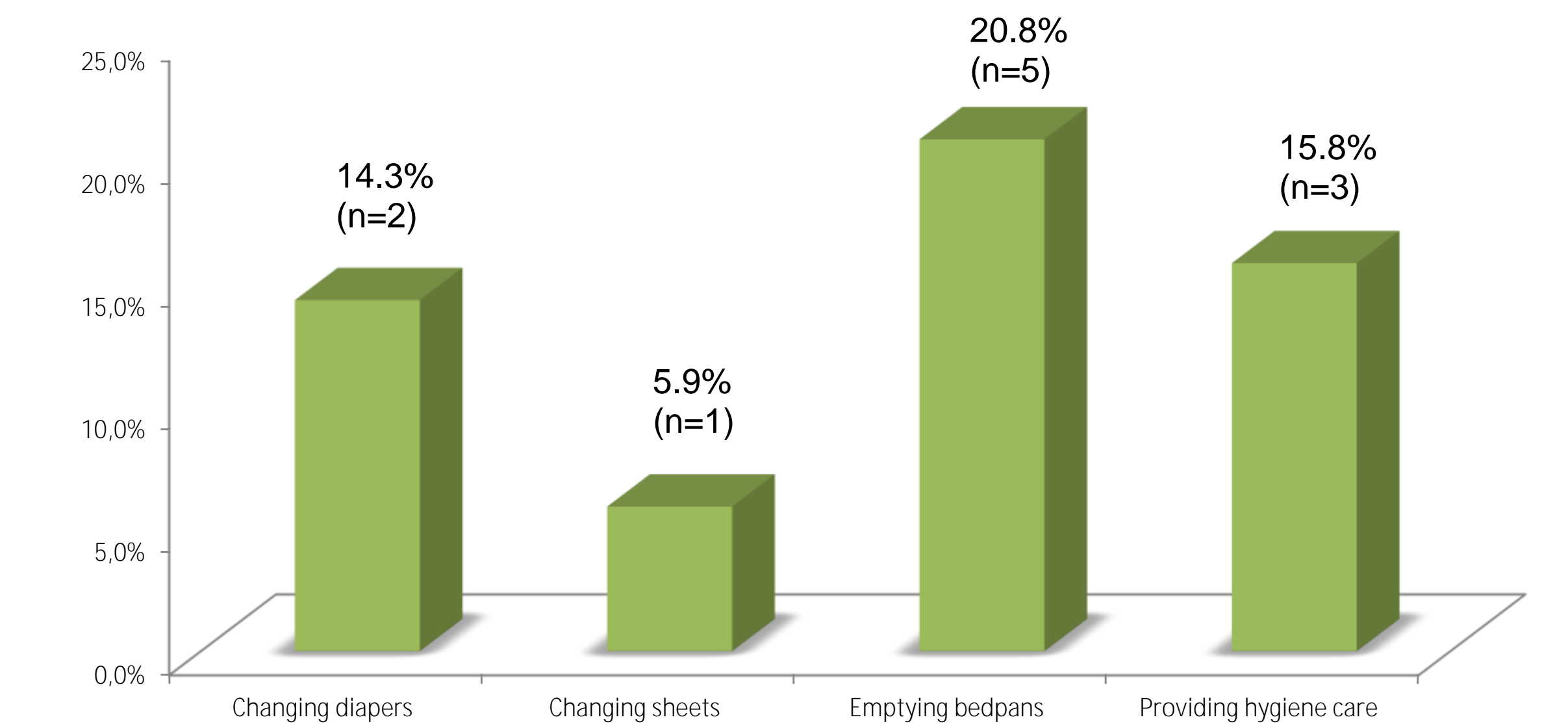


Figure 3 Proportion of nurses wearing full protective equipment for non-technical activities

- Pharmacists and pharmacy technicians wore all off the recommended protection for all activities (100.0%).

DISCUSSION/CONCLUSIONS

- Our aim was to implement a biological monitoring program to have a better description of the workers exposure and to use this as an opportunity to increase awareness. An excellent participation rate was obtained.
- Additional studies will be conducted to confirm the usefulness of this program.
- The absence of positive samples is an indication that good working practices were used. It is also explained by:
 - Activities conducted to increase awareness prior to study;
 - Low surface contamination in the hospital.
- We found areas where the worker protection could be enhanced, especially for non technical nursing activities.
- Repeating the biological monitoring measures every few years could help confirming that the working practices are continuously followed by workers and would provide a good snapshot of the current situation.