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

Céline Poupon1, Cynthia Tanguay1, Caroline Plante2, Sébastien Gagné3, Nicolas Caron4, Jean-François Bussières1,4

Pharmacy Department and Pharmacy Practice Research Unit, CHU Sainte-Justine, Montreal. 2Nursing, CHU Sainte-Justine, Montreal.
3Centre de toxicologie du Québec, Institut National de Santé Publique du Québec, Quebec. 4Faculty of pharmacy, Université de Montréal, Montreal

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-fluorouracile.

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.

POPOPULATION

- 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 involved.

Table 1 Population

<table>
<thead>
<tr>
<th>Job</th>
<th>Working in hematology-oncology (n=92)</th>
<th>Working in central pharmacy (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Pharmacy technicians</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Doctors</td>
<td>7</td>
<td>0</td>
</tr>
</tbody>
</table>

SEX

- Women: 76
- Men: 16

AGE (years)

- 20-29: 41
- 30-39: 22
- 40-49: 14
- ≥50: 9
- Not available: 6

URINE SAMPLES

- No urine samples showed detectable concentrations for the four drugs evaluated (0/101; 0/74 nurses, 0/11 pharmacists, 0/6 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.

DISCUSSION/CONCLUSIONS

- No accidental exposure was reported during the study.

- Repeating the biological monitoring measures every few years could help confirming that good working practices were used.

- It is also explained by:
  - 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.

- 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.

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

- 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.

- We found areas where the worker protection could be enhanced, especially for non technical 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.