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INTRODUCTION

- 2004: Alert on the prevention of occupational exposure to hazardous drugs by the National Institute for Occupational Safety and Health (NIOSH)
- 2008: Prevention guide on handling hazardous drugs by the Association paritaire pour la santé et la sécurité du travail du secteur des affaires sociales (ASSTAS)
- 2010: Newsletter on handling hazardous drugs in retail pharmacies by Quebec Order of Pharmacists (OPQ)
- 2010, 2012: Update of NIOSH list of hazardous drugs list → **167 drugs**
- Many studies on environmental contamination with hazardous drugs have been conducted in hospital settings but very few in retail pharmacies

Handling hazardous drugs in retail pharmacy = challenge

OBJECTIVES

- To evaluate environmental contamination with methotrexate, cyclophosphamide and ifosfamide in Quebec retail pharmacies
- To describe practices in Quebec retail pharmacies when handling hazardous drugs

METHODS

- A descriptive, cross-sectional study
- Retail pharmacies in the Montreal (Quebec, Canada) area were recruited on a voluntary basis using a list of contacts from two pharmacy groups
- Three standardized sites were sampled in each participating retail pharmacy



Surface of a 2.5-mg methotrexate tablet container 66 cm²



Tray of a pill counter used only to handle hazardous drugs: 300 cm²



Preparation counter 600 cm²

- Concentration of methotrexate, cyclophosphamide and ifosfamide was measured
 - Samples were analyzed by UPLC-MS-MS
 - A sample was considered positive if the value was above the Limit Of Detection (LOD)
 - LOD for the exterior of a methotrexate container (LOD-ct): 0.068 ng/cm²
 - LOD for a pill counter tray (LOD-pc): 0.015 ng/cm²
 - LOD for the preparation counter (LOD-prep): 0.0075 ng/cm²
- Nine Working Practices in Retail Pharmacies were assessed

RESULTS

- 20 retail pharmacies participated
- 3 sites were sampled in each of the retail pharmacies
- 60 analyzed samples
- Traces of methotrexate were measured in 12 out of the 20 pharmacies (60%)
- No traces of cyclophosphamide or ifosfamide were detected
- 22% (13/60) of the samples were methotrexate-positive:
 - 10% (2/20) from methotrexate containers
 - 55% (11/20) from pill counter trays used only for hazardous drugs
 - no samples from the preparation counters

Table I. Profile of Environmental Contamination with Methotrexate in Twenty Quebec Retail Pharmacies

Sample sites	Surface concentrations of methotrexate (ng/cm ²)		
	Median	75 th percentile	Maximum
Exterior of a methotrexate container (n = 20)	< LOD-ct	< LOD-ct	0.07
Pill counter tray (n = 20)	0.08	0.39	15
Preparation counter (n = 20)	< LOD-prep	< LOD-prep	< LOD-prep

Table II. Working practices in retail practices

WORKING PRACTICES	Proportion (n)
Possibility of sterile compounding	0% (0/20)
Presence of a storage space reserved for hazardous drugs	40% (8/20)
Presence of a space dedicated to handling hazardous drug tablets	0% (0/20)
Existence of a pill counter used only for hazardous drugs	100% (20/20)
Mandatory wearing of gloves when preparing hazardous drugs	0% (0/20)
Mandatory wearing of a smock when preparing hazardous drugs	75% (15/20)
Cleaning pill counter after preparing hazardous drugs	100% (20/20)
Nature of the product used to clean surfaces that come into contact with hazardous drugs :	
↳ 70% isopropanol	35% (7/20)
↳ Soap and water	20% (4/20)
↳ Wet ones® Wipes	25% (5/20)
↳ One of the three product	20% (4/20)
Awareness that hazardous drugs should not be crushed or cut	100% (20/20)

DISCUSSION

- Similar number of methotrexate positive samples (27% -11/44) was obtained in a study conducted in 2009 in other Quebec retail pharmacies¹
- Preventive measures

INFORMATION

Inform staff members

STORAGE

Storage dedicated

SPECIFIC HANDLING

Gloves for handling

Dedicated pill counter

Do not crush
Do not cut

CLEANING

Soap and water

Do not clean with Isopropanol 70

Periodic environmental monitoring

CONCLUSION

- Presence of traces of methotrexate in 12 out of 20 Quebec retail pharmacies
- Few data exist on the presence of traces of hazardous drugs in retail pharmacies
- No safe occupational exposure limit exists
- Retail pharmacists must be aware of the presence of traces of hazardous drugs and the need to comply with personal protection measures in order to reduce staff occupational exposure to hazardous drugs

REFERENCES

1. Bussièrès JF, Tanguay C, Soulard A et al. Étude pilote sur la surveillance environnementale en pharmacie communautaire. Bulletin d'information toxicologique. 2010;26(3):15-19.

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