

INTRODUCTION

NIOSH Alert recommends:



- Hazardous drugs tubes to be primed in the pharmacy rather than in patient care zones
- A CSTD may be used when preparing and administering hazardous drugs

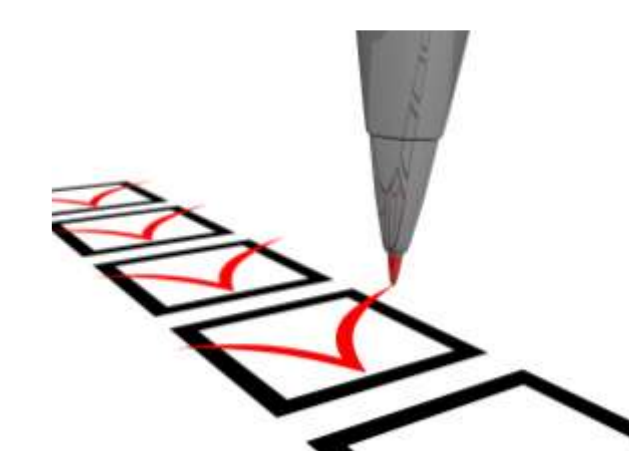
OBJECTIVE

To evaluate the IMPACT and APPRECIATION of the centralization of tube priming in the pharmacy and the use of a CSTD.

Reducing hazardous drug environmental contamination?

METHODS

- Prospective, experimental and comparative study
- Sites in the hematology-oncology satellite pharmacy and in care – unit were analyzed
- Limits of detection:
 - LOD Cyclophosphamide = 0.0015 ng/cm²
 - LOD Ifosfamide = 0.0012 ng/cm²
 - LOD Methotrexate = 0.0060 ng/cm²
- Three phases:
 - Phase I: Tube priming performed in the hematology-oncology unit
 - Phase II: Tube priming performed in the hematology-oncology pharmacy
 - Phase III : Closed System Transfer Device used in the hematology-oncology unit
- Pharmacy technicians satisfaction evaluated using a questionnaire



RESULTS

PHASE I - PHASE II: before and after the centralization of the tube priming

75 samples in phase I and in phase II

Proportion positive samples: No statistically significant difference for CP, IF or MTX

Surface concentration: No statistically significant difference in the pharmacy sample sites for CP, IF, MTX

Statistically significant difference in the care area for CP and IF on the floor in front of the cytotoxic waste container (Median CP: 0.08 vs. 0.03 ng/cm², p < 0.001; Median IF: 0.90 vs. 0.15 ng/cm², p < 0.001)

Table 1: Proportion of CP, IF and MTX positive samples

Sampling sites	Cyclophosphamide						Ifosfamide						Methotrexate						Concentration (ng/cm ²)		
	Positive samples n (%)		P	Positive samples n (%)		P	Positive samples n (%)		P	Positive samples n (%)		P	Median [Min – Max]		P						
	Phase I	Phase II		Phase I	Phase II		Phase I	Phase II		Phase I	Phase II		Phase I	Phase II							
Pharmacy sites (N=45) (Hood / Delivery tray / Validation tray)	15 (33)	10 (22)	0.239	12 (27)	10(22)	0.624	1 (2)	1 (7)	0.306	< LOD	< LOD	0.226	< LOD-8.80	< LOD-28.00							
Patient care unit sites (N=30) (Floor in front of the waste container / Floor below the area for tube priming)	30 (100)	30 (100)	ND	30 (100)	30 (100)	ND	0 (0)	0 (0)	ND	0.08	0.06	0.222	[0.06-0.37]	[0.02-0.39]							

PHASE I - PHASE III: before and after using Closed System Transfer Device

75 samples in phase I and in phase II

Proportion positives samples: No statistically significant difference for IF and MTX

Higher proportion of CP positive samples in the hood, delivery tray and validation tray

Surface concentration: Concentration measured was below the LOD for most sample sites except floor in the front of the hood for CP and IF

Table 2: Proportion of CP, IF and MTX positive samples before and after using a CSTD for hazardous drugs preparation

Sampling sites	Cyclophosphamide						Ifosfamide						Methotrexate						Concentration (ng/cm ²)		
	Positive samples n (%)		P	Positive samples n (%)		P	Positive samples n (%)		P	Positive samples n (%)		P	Median [Min – Max]		P						
	Phase I	Phase III		Phase I	Phase III		Phase I	Phase III		Phase I	Phase III		Phase I	Phase III							
Pharmacy sites (N=45) (Hood / Delivery tray / Validation tray)	15 (33)	0 (0)	<0.001	12 (27)	5 (11)	0.059	1 (2)	2 (4)	0.557	< LOD	< LOD	< 0.001	< LOD-8.80	< LOD-< LOD							
Pharmacy sites (N=45) (Validation counter / Floor in the hood)	NA	10 (33)	ND	NA	15 (50)	ND	NA	3 (67)	ND	NA	< LOD	ND	< LOD-0.02	< LOD-0.02							

Evaluation of the appreciation of pharmacy technicians

Centralization of the tube priming:

- All pharmacy technicians (n = 5) indicated that was as easy as it was using current practices
- 40% of the pharmacy technicians found that it was slower
- 80% found it more cumbersome than current practices
- No pharmacy technician reported an increase in the number of technical issues or in their perceived risks of absorbing drugs, injury or spillage

Using a Closed System Transfer Device:

- 100% of the pharmacy technician found that using the CSTD increased technical issues and the risk of spillage
- 80% considered that the CSTD was slower and more cumbersome to use
- 60% considered that using a CSTD was more difficult and increased the risk of drug absorption through the skin and by inhalation when the CSTD breaks

Difficulties:

- Appearance of particles in vials: particles came from the vials' protective rubber stopper after the pharmacy technician perforated the vial membrane only three times
- Problem of MTX vial pressure balance: the CSTD was ejected from the vial twice and the drug flowed profusely inside and outside the hood

DISCUSSION

- Centralized tube priming with NaCl 0.9% in the hematology-oncology satellite pharmacy was safe for the staff and for the patients: it maintained preparations in a sterile environment and minimized risks associated with spills and splashes by nurses
- Our study confirms the efficacy of CTSD but ergonomical and economical issues must be further studied to confirm the cost-effectiveness ratio and value of CTSD

CONCLUSION

- Centralization of tube priming in the pharmacy did not increase surface contamination in pharmacy, but reduced floor contamination in patient care areas
- CSTDs reduced contamination in pharmacy, but issues were raised by pharmacy technicians