Evaluation of Hazardous Drug Clean™ (HDClean™), a two-step towelette system, in removing surface contamination of hazardous drugs

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Introduction

- Health care workers are exposed to hazardous drugs as a part of the dispensing and administration of medications
- Evaluation of pharmacy and nursing employees have documented the presence of hazardous drugs on both the surface of their work area and in their urine
- Studies have also been conducted that have detected the presence of chemotherapy on the outside of drug vials
- Surface wipe studies are recommended to be completed regularly in areas that prepare and administer hazardous drugs in order to understand the risk of exposure to employees
- ChemoGLO™ is a wipe kit that has been used in over 400 hospitals over the past 4 years
- Surface contamination for 5-FU, cyclophosphamide, ifosfamide, docetaxel, paclitaxel, and cisplatin are reported following use of the wipe kit
- As much as 80–90% of hospitals wiped have documented surface contamination of hazardous drugs, even when using all of the recommended best practices
- Because of the concerns associated with documented hazardous drug residue, HDClean™ was developed as a method to remove all detectable surface contamination
- HDClean™ utilizes a two-step system with specialized cleaning solutions and towelettes to remove hazardous drug residue from surfaces

Objectives

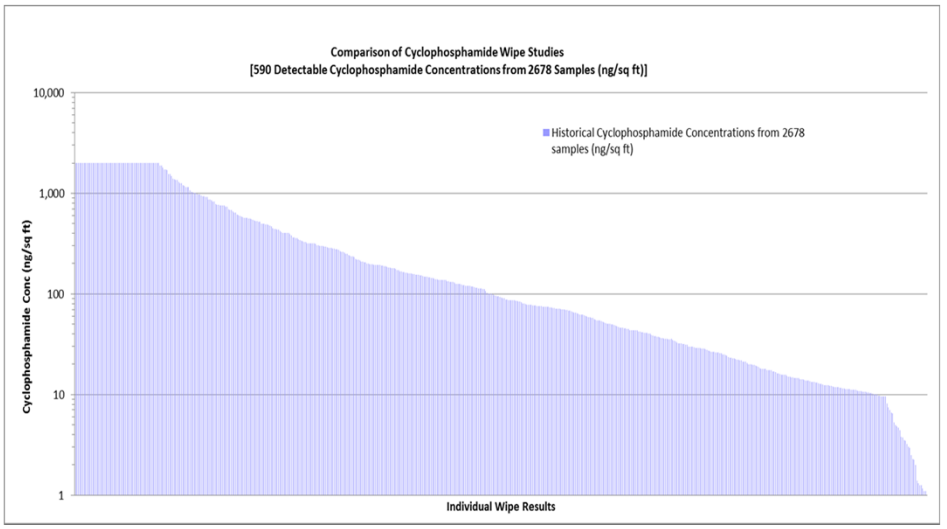
- To evaluate the effectiveness of HDClean™ in removing 5-FU, cyclophosphamide, ifosfamide, docetaxel, paclitaxel and cisplatin

Methods

- A total of 14 separate areas were contaminated with 5-FU, cyclophosphamide, ifosfamide, docetaxel, paclitaxel and cisplatin
- Each area was 2 ft x 2 ft (4 ft^2)
- Exposure of each drug on the 4 ft^2 site was 1,000 ng/ml
- Seven areas were cleaned with HDClean™ prior to sampling
  - Towelette #1 was used first to clean the area and then followed by towelette #2
  - Procedure was repeated a second time on each contaminated area
- ChemoGLO™ wipe methods and liquid chromatography tandem-mass spectrometry (LC-MS/MS) assay for 5-FU, cyclophosphamide, ifosfamide, docetaxel, and paclitaxel, and inductively coupled plasma mass spectrometry (ICP-MS) assay for cisplatin were used for analysis

Results

- ChemoGLO™ experience for surface contamination risks with cyclophosphamide
  - 3.4% of samples: detectable surface concentration > 1 ng/cm^2
  - 7.7% of samples: detectable surface concentration 0.1-1 ng/cm^2
  - 88.9% of samples: detectable surface concentration < 0.1 ng/cm^2



- Bench top surfaces were contaminated with 6 different chemotherapy agents (5-FU, cyclophosphamide, ifosfamide, docetaxel, paclitaxel and cisplatin) at a concentration of 1,000 ng/ml
- Seven of the areas were wiped using HDClean™ (two-towelette system, repeated once) and 7 were not wiped
- ChemoGLO™ wipe kit was used to detect residual surface contamination of the hazardous drugs

	Total number of tests	ChemoGLO™ measured concentrations of each drug
Samples not using HDClean™	7	900 – 1,000 ng/ml
Samples using HDClean™	7	Non-detectable

- LC-MS/MS assays for 5-FU, cyclophosphamide, ifosfamide, docetaxel, and paclitaxel had a lower limit of quantification for each drug of 10 ng/mL.
- ICP-MS assay had a lower limit of quantification for cisplatin of 1 ng/mL

Conclusions

- Surface contamination in hospitals continues to be detectable, even when all best practices are being utilized
- Health care employee risk can be evaluated with regular surface contamination monitoring
- Additional strategies and products need to be developed to minimize surface contamination of hazardous drugs and subsequent employee risk
- HDClean™, when used according to product recommendations, demonstrated removal of all detectable surface contamination of the following chemotherapy drugs: 5-FU, cyclophosphamide, ifosfamide, docetaxel, paclitaxel, and cisplatin at exposures that have been reported in hospitals and pharmacies.

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