



Hard Surfaces Contaminated with Hazardous Drugs: Effectiveness of Accelerated Hydrogen Peroxide® Disinfectant as Agent of Decontamination - September 2018

Abstract

Hazardous drugs (also known as cytotoxic agents, and include chemotherapy agents) are used in patient treatment for a range of diseases or conditions from arthritis to cancer therapy. These agents can also affect healthy cells and are known to have high toxicity which can be harmful to healthcare staff who are not under treatment, thus healthcare staff must be protected from exposure to these drugs on a daily basis. Many hazardous drug molecules are known to be highly resistant to inactivation by chemical disinfectants. In order to properly protect personnel preparing or administering hazardous drugs, choosing a disinfectant with the ability to decontaminate (remove/cleanse) or deactivate (degrade) hazardous drugs is an essential aspect of the pharmacy's/laboratory's infection control and biosecurity program. In this investigation, Accelerated Hydrogen Peroxide® (AHP®) exhibited complete removal of all hazardous drugs tested from hard nonporous surfaces.

Background

The United States Pharmacopeia (USP) general chapter 800 ("Hazardous Drugs—Handling in Healthcare Settings" published 2/1/2016) defines the removal (decontamination) of hazardous drugs (HD). "**Decontamination** occurs by inactivating, neutralizing, or physically removing HD residue from non-disposable surfaces and transferring it to absorbent, disposable materials (e.g., wipes, pads, or towels) appropriate to the area being cleaned. When choosing among various products available for decontaminating HDs, consideration should be given to surface compatibility and facility requirements. It is imperative to adhere to manufacturer's use instructions. Because of the growing number of assays available for HDs, additional surface wipe sampling is now possible and should be done to document the effectiveness of any agent used for decontamination of HD residue from work surfaces (see *Environmental Quality and Control*)."

There is limited information available regarding disinfectant efficacy against hazardous drugs. Bleach used at higher concentrations is often used as a standard oxidizing agent for cleaning and disinfecting surfaces where chemotherapy drugs have been prepared. However, there are a number of health and safety concerns when using bleach in a healthcare environment, and as such, a safer disinfectant alternative is often sought. A number of studies have evaluated the use of other oxidizers such as hydrogen peroxide as an agent to degrade chemotherapy agents and found the oxidizing properties of hydrogen peroxide to be effective in degrading chemotherapy drugs. Another study looked at the effect that pH had on degradation of the chemotherapy drugs and found that a low (acidic) pH was very effective. As AHP®-based disinfectants utilize low levels of hydrogen peroxide and work optimally at a lower pH, the aim of this investigation was to determine if AHP® disinfectant wipes were capable of decontaminating (cleansing) hard non-porous surfaces that may have come into contact with hazardous drugs.

Study

In this investigation a clean and sterile stainless steel surface was portioned into eight equal clean areas of which 7 of the areas were soiled using a mixture of 10 different hazardous drugs (Cyclophosphamide



Monohydrate, 5-Fluorouracil, Doxorubicin HCl, Epirubicin HCl, Etoposide Phosphate, Ifosfamine, Irinotecan HCl, Methotrexate, Paclitaxel, and Vincristine Sulfate). The 8th space was used as the control surface. Using Bureau Veritas' ChemoAlert Surface Contamination 10-pack kit, one recovery swab was dipped into the recovery solution and was used to swab the soiled area. The same was done to the control area. These two swabs were used to provide scoring points for a "100% soiled" and "0% soiled" area. Next, each of the remaining areas were wiped using AHP® disinfectant wipes (Oxivir Tb and Accel Prevention), containing 0.5% hydrogen peroxide. The wiping action used in this test was the same standard method that is used in conducting antimicrobial tests done on disinfectants for US EPA registration (ASTM 2362-15 "Standard Practice for Evaluation of Pre-saturated or Impregnated Towelettes for Hard Surface Disinfection"). The disinfected surfaces were allowed to dry at room temperature for 10 minutes. The same method of surface swabbing was done on the disinfected surfaces, using the kit's provided recovery solution and swabs. Each recovery swab was sent back to Bureau Veritas for quantitative analysis of each of the recovery swabs.

Results

Concentration readings from swabs sampled from each surface area were analyzed for all ten hazardous drugs. Treatment of the soiled surfaces using either of the two AHP® disinfectant wipes resulted in removal of all ten deposited hazardous drugs to below detectable limits of <5.0 ng. In comparison to the blank surface that was used as the control, the disinfected areas tested to be as clean as the blank, uninoculated area (<5.0 ng).

Conclusions

Based on this study, AHP® disposable wipes would be an excellent choice for decontamination of hard surface contaminated with hazardous drugs in pharmacy, laboratory, and possibly patient settings. AHP® meets the USP 800's criteria for the decontamination (removal) of hazardous drugs and also meets their definition of a good disinfectant as AHP® is not a toxic, volatile, corrosive or otherwise harmful disinfectant technology (USP 1072, USP 797).

Practice Issues

USP 800 discusses keeping all workers safe around hazardous drugs, but that document and any OSHA or NIOSH documents which discuss hazardous drugs are silent on what to use to decontaminate a room that has had a patient receiving hazardous drugs. If there is a spill of a hazardous drug, or a spill of body fluids from a patient receiving hazardous drugs, decontamination must occur (USP 800, NIOSH, OSHA). Because many hazardous drugs are excreted in urine, sweat, saliva, feces and other body fluids, routine decontamination at discharge would be prudent to protect the next patient entering the room (or any other healthcare staff). Disposable Oxivir Tb or Prevention wipes would be treated as hazardous drugs under the facility's Hazardous Drug protocol, and the used wipes would be disposed of as hazardous waste.

References

NIOSH <https://www.cdc.gov/niosh/docs/2004-165/pdfs/2004-165.pdf>

NIOSH <https://www.cdc.gov/niosh/docs/2012-150/pdfs/2012-150.pdf>

OSHA https://www.osha.gov/SLTC/hazardousdrugs/controlling_occex_hazardousdrugs.html



USP 800 Hazardous Drugs – Handling in Healthcare Settings

USP 797 Pharmaceutical Compounding – Sterile Preparations

USP 1072 Disinfectants and Antiseptics

American Society of Health-System Pharmacists. ASHP guidelines on handling hazardous drugs. *Am J Health-Syst Pharm.* 2006; 63:1172-93.

NON-STERILE COMPOUNDING - CLASS 7, 8 CLEAN ROOMS – DIVERSEY AHP® PRODUCTS:

Product	Oxivir® 1 RTU / Wipes	Oxivir® Tb RTU / Wipes	Oxivir® Five 16
Contact Time (Min)	1	1	5
			

If there are any questions about this assessment or any Diversey products, please contact Diversey Customer Technical Support at 1-800-558-2332, option 5.