

WHAT IS THE BEST CHEMICAL DECONTAMINATION SOLUTION FOR CONVENTIONAL ANTI-NEOPLASTIC DRUGS IN A HOSPITAL COMPOUNDING UNIT?



COMPOUNDING UNIT?



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1. Objectives

- Occupational exposure to conventional antineoplastic drugs → daily issue in hospitals
- Efficacy data are lacking on many marketed biocides and several chemical decontamination methods are currently available
- Microbicides are not sufficiently efficient in removing chemical contamination
- Purpose: To perform a literature review for choosing a decontamination solution to implement in compounding units.**

2. Methods

2a. Selection of published articles

- Requests on Pubmed
 - “antineoplastic agents AND cleaning”
 - or “antineoplastic agents AND chemical degradation”
 - or “antineoplastic agents AND chemical decontamination”.

2b. Performances criteria applied for studies evaluation

- Decontamination efficiency (Eff_Q)

$$Eff_Q = \frac{1}{n} \times \sum_1^n Eff_q \text{ where } Eff_q = 1 - \frac{\text{quantity after decontamination}}{\text{quantity before decontamination}}$$

- Number and nature of tested contaminants,
- Risks of use
 - 3a. Hazardousness of the decontamination solution
 - 3b. Implementation difficulties
 - 3c. Respect of aseptic environment

3. Results on selected published articles

3a. Selected articles

274 identified articles



Selected articles (N = 17)

- Degradation studies (N = 6)
- Desorption studies (N = 8)
- Real-life studies (N = 3)

Reasons for articles' exclusion

- Irrelevant records, duplicates (N=241)
- No decontamination study, none or abstract only, unused drugs (N=15)
- Insufficient data (N=1)

3b. Application of performances criteria

- Eff_Q ranged between [$\leq 10\%$; 100%]
- Between 1–14 compounds of various dangerousness and physico-chemical properties tested by method
- Risks of use
 - 3a. Mutagenic compounds sometimes generated
 - 3b. Oxidants degrade metal parts of facilities
 - 3c. A film may remain after using tensioactives

Results of decontamination solutions ¹

- 19 degradation methods identified → chemical reaction which degrades contaminants
- 40 desorption methods identified → physical process involving dissolution and desorption of contaminants
- 3 types of tested decontamination solutions :
 - Oxidants – ex: sodium hypochlorite (NaOCl) or hydrogen peroxide
 - Antiseptics – ex: 70% isopropanol (IPA) or 0.05% chlorhexidine
 - Tensioactive agents – ex: Sodium dodecylsulphate (SDS) or dishwashing liquid

	Solution	Drugs (N)	Eff_Q
The applied performance criteria lead to select only 3 decontamination solutions	0.5% NaOCl	13	97.9±2.3% [from 93.9 to 100.0]
	10 ⁻² M SDS / 100% isopropanol (80/20)	12	91.9±6.7% [from 77.7 to 100.0]
	Marketed 2-steps towelettes kit (1. amine IV solution, 2. Isopropanol)	6	94.5±11.9% [from 68.6 to 100.0]

4. Discussion

- Difference in application modalities regarding biological and chemical facilities' monitoring
 - NaOCl → risk of facilities' alteration with time
 - SDS/IPA → risk of residual film after application
- Some of them have been tested on real-life studies: 10⁻² M SDS / 100% IPA (80/20) ² and marketed towelettes kit ³
- Because each solution has been tested on different contaminants, new studies are required to confirm their ability to decontaminate more conventional antineoplastic drugs.

5. Conclusion: The SDS/IPA solution gives promising results regarding its overall Eff_Q and better safety concerns for facilities and operators. Further studies are required to assess its performance on a wide panel of contaminants.

Keywords: Antineoplastic drugs; compounding; contamination; occupational exposure; chemical decontamination

Bibliography: ¹ Simon N et al., J Oncol Pharm Pract., accepted for publication on January 27th, 2019 / ² Anastasi et al., Ann Occup Hyg 2015;59(7):895–8. / ³ Cox et al., J Oncol Pharm Pract 2016;23:103–15.

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