

## Reviewer's report

**Title:** Characterization of exposures to cleaning products used for common cleaning tasks in hospitals -a pilot study

**Version:** 1 **Date:** 2 June 2008

**Reviewer:** Elise Pechter

### Reviewer's report:

This article is an important contribution to an under-studied field. It provides an approach and methods to consider cleaning tasks in hospitals. There are no other articles that provide this concrete, practical and scientific perspective. However, there are a number of issues that must be addressed.

Compulsory revisions:

1. Conclusion statements are included beyond the scope of the presented data.
  - a. P3 "This paper provides data on . . . methods that can be easily employed for qualitatively assessing the potential exposures in the workplace." The authors describe use of a validated system, cite articles regarding its use, but do not describe how to use the method, or how it was applied to this task. This might be corrected by wording—this paper describes results of application of the DREAM method to cleaning tasks in hospitals. Information is not provided about the limitations of the DREAM method which does not appear to evaluate whether cleaning products are sprayed onto rags or directly onto a surface (only described as sprayed directly onto the surface in Figure 1. Nor does it appear to draw lessons from applying the method.
  - b. P5 "The extent to which most cleaning chemicals may permeate the skin . . . ." The only literature cited are 3 articles about glycol ethers.
  - c. P6 The statement that hospitals are driven to clean and disinfect "by the need to protect workers from transmission of blood borne pathogens," is not correct and not supported by data or references. Hospitals are driven by need to protect patients from infection—fecal oral (such as *Clostridium difficile*) and blood borne.
  - d. P8 The authors conclude that the products investigated "are representative of the major products/ingredients used in Massachusetts," because the "variability of ingredients within product lines were greater than between the same product [sic] produced by different manufacturers." This does not justify a claim that the products reviewed in 6 hospitals are representative of all hospitals.
  - e. P9 An "ingredient was considered to be more hazardous" but the criteria blur potential to cause harm and potential to be exposed. Hazard must be defined carefully. If the term means the potential to be exposed, then the method of use should be included. If it includes the potential for absorption, then clothing and shoes should be mentioned. Method of application is subsumed under task frequency on page 10, which is confusing. If the evaluation is about relative

hazard, information should be included about severity of outcome, strength of the sensitizing or irritating potential and other capacity to cause harm. P16 describes that the window/mirror/glass cleaning product is sprayed—but not whether the target of the spray is the rag or surface.

2. Cleaning is not distinguished from disinfection, which is a key issue in hospitals.

a. Most of the literature cited is from domestic and commercial cleaning, with the exception of reference 11, without comment about the absence of research on cleaning in health care settings (pp3-4).

b. The description of cleaning and disinfecting (P6) blurs the differences between cleaning in health care settings and in residences.

3. Literature review in Introduction summarizes findings in relation to cleaning, but does not comment that none of the articles are about cleaning in hospitals or other health care institutions.

4. Tables 4 and 5 are labeled as “potential and actual” dermal exposures, but “actual” is not defined or discussed.

5. Missing references

a. Vincent et al 1993 on page 5

b. Statement “Dermal exposures to cleaning agents and related health impacts have been investigated by only a few studies.” No references provided.

Minor essential revisions

1. Numerous typos

a. bow for bowl

b. voluntaries for volunteers

c. VOC and VOCs used inconsistently

d. Worker’s and workers’ used inconsistently

2. Editing of language is needed.

3. P22. “In many exposure scenarios the odor was unbearable.” This assessment is subjective, confusing, and not in keeping with a scientific paper

Minor recommended revisions

1. First sentence in discussion includes “these exposures” without preceding referent

2. Consistently use either cleaning agents or cleaning products.

3. Add reference to Rosenman KD 2006 “Cleaning products-related asthma.” Clinical Pulmonary Medicine Vol 13. Pages 221-228.

4. The terms routine and common seem to be used interchangeably to describe cleaning tasks, but not well defined. Suggest using one consistently.

5. P7 “disinfecting have” should be disinfecting tasks have or disinfecting has . . .

6. “Risk to inhalation of aerosols particles . . .”—should be—risk of inhalation to

aerosols (or aerosolized) particles

7. It would be useful to have an explanation of why inhalation exposures must be estimated, not measured directly.

8. P11, 1st paragraph, “concentration in air outside the layer and area . . .” is confusing. What layer?

9. P11, 2nd paragraph, a variable Skin-P TASK is described. Is this the same as the last column in Tables 4 and 5? If so, they should be labeled the same.

10. P14 If ethanolamines are absorbed through the skin, as stated, then the reference should be provided, or the absence of a skin designation by OSHA and ACGIH should be noted. ACGIH has a TLV TWA of 3ppm as well as a STEL.

11. P14-15. Three ethanolamines are commonly used in cleaning products, mono- di- and triethanolamine. Only MEA is mentioned. This section references diamines and triamines which are different.

12. P17 “a special machine” is not a good description.

13. The section on dermal exposures from cleaning tasks (P19) does not mention clothing or personal protective equipment. A description of the importance (or lack of importance) of clothing and shoes in this model would be welcome.

14. P24 I don't understand the reference to Figure 3. Could this be a reference to Tables 4 and 5?

15. P24-25. Discussion of green products is confusing. “These ‘green’ products” are accused of including hazardous ingredients, without being clear whether they are Green Seal (GS) or Green Guard or other. Quats are not in GS products, since they are pesticides and labeled/controlled by EPA.

16. Table 1. Missing CAS numbers for the first floor care product. Chemicals with the same CAS numbers should be listed the same in the ingredients section, perhaps with the synonyms included. For example diethylene glycol monoethyl ether CAS 111-90-0, same as 2-(2ethoxyethoxy)ethanol.

**Level of interest:** An article of outstanding merit and interest in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No, the manuscript does not need to be seen by a statistician.