



Ciência & Saúde Coletiva

ISSN: 1413-8123

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Associação Brasileira de Pós-Graduação  
em Saúde Coletiva  
Brasil

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Ciência & Saúde Coletiva, vol. 13, abril, 2008, pp. 683-688

Associação Brasileira de Pós-Graduação em Saúde Coletiva

Rio de Janeiro, Brasil

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## Labelling of household products and prevention of unintentional poisoning

Rotulagem de produtos domésticos e a prevenção de envenenamentos não-intencionais

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**Abstract** *Unintentional poisoning occurs mainly in childhood due to ingestion of common household products. A decisive factor is the lack of knowledge concerning the potential toxicity of these products. A random study of 158 labels of cleaning products was conducted at the National Institute of Quality Control in Health – Brazil. Health hazard warnings, first aid in case of poisoning and storage instructions were evaluated to assess the quality of information provided to the consumer regarding the risks inherent in these products. Among these labels, 75% were considered inadequate since they did not provide all cautionary information necessary to avoid the health hazards associated with these products. First aid instructions in the case of inhalation were missing on more than 50% of labels studied and 47% did not recommend taking the label to a health professional in case of accident. Furthermore, the labels did not provide other important warnings such as “read before use” and “keep in original container”. The results indicate that the labelling of cleaning products does not provide all safety information recommended for consumers.*

**Key words** *Risk, Poisoning, Household products, Warning, Label*

**Resumo** *Intoxicações não-intencionais ocorrem principalmente na infância devido à ingestão de produtos de uso doméstico. Um fator determinante é a falta de conhecimento sobre a toxicidade destes produtos. Um estudo aleatório de 158 rótulos de produtos de limpeza foi realizado no Instituto Nacional de Controle de Qualidade em Saúde – Brasil. Advertência sobre os riscos à saúde, orientações para os primeiros-socorros em caso de envenenamento e instruções de armazenamento foram avaliadas para verificar a qualidade das informações fornecidas ao consumidor sobre os riscos inerentes ao uso destes produtos. Do total de produtos avaliados, 75% foram considerados inadequados porque não forneciam todas as informações necessárias para prevenir danos à saúde decorrentes do seu uso. Instruções para os primeiros-socorros no caso de inalação foram omitidas em mais de 50% dos rótulos estudados e 47% não recomendavam levar o rótulo para o médico em caso de acidente. Além disso, os rótulos não forneciam outras importantes advertências como “ler antes de usar” e “manter no frasco original”. Os resultados indicam que a rotulagem dos produtos de limpeza de uso domiciliar não fornece todas as informações para garantir a segurança da população. Palavras-chave Risco, Envenenamento, Produtos domésticos, Advertências, Rótulo*

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## Introduction

Unintentional poisoning with children under 5-years old is reported in several countries and is frequently related with the ingestion of household products. These events are not usually fatal but account for high morbidity<sup>1-6</sup>. Among household products there are several cleaning agents, which are complex mixtures of chemicals that vary widely in their toxic potential such as bleachers, pesticides, corrosive substances, tensoactives and others.

In Brazil, as in others countries, household products are the second major cause of poisoning, but they are the first when it comes to unintentional poisoning<sup>3,7,8</sup>.

Various factors can be related to the causes of unintentional poisoning in children: the accessibility of the poison to the child, limited family supervision, lack of parental knowledge of the potential toxicity of common household products and parents who are unaccustomed to read the warnings on labels. Some of these reasons cause inadequate storage of these products at home by parents<sup>2,9,10,11</sup>.

Cleaning products are reported to be responsible not only for poisoning due to the ingestion but also other health damages, such as allergic contact dermatitis, inhalation from mixing household cleaning agents and ocular injuries.

Labelling of household products plays an important role in the prevention and treatment of poison exposure, since the label should be a source of toxicological information and instructions to first aid for parents and health professionals<sup>9,12</sup>.

Brazil and other countries use the law to protect the population from hazardous household products. This includes warning labelling, instructions of use and child-resistant containers. Only products appropriately labelled in accordance with the law can be distributed and sold in Brazil<sup>13</sup>.

The purpose of this study was to evaluate the toxicological information on labels of cleaning products analysed at the National Institute of Quality Control in Health - Rio de Janeiro, Brazil.

## Methodology

This study involved all cleaning products of domestic use (n=158) that were analysed at the National Institute of Quality Control in Health from 1997 to 2002.

The information described on their labels was evaluated to determine if it provided consumers with adequate warnings of inherent health risks. Computerized information resource Poisindex Information System<sup>14</sup> was used to obtain active ingredient information to evaluate statements about risk and first aid of these products. All products had only one active ingredient according to the formulation on label, which were then further categorized into four groups according to the classification below:

1) Sodium hydroxide, phenol/cresol, hypochlorite, formaldehyde, cationic tensoactive - ingestion may result in corrosive burns of digestive tract and are severe eye and skin irritants and inhalation may cause pulmonary oedema. Cationic tensoactive and formaldehyde may cause allergic contact dermatitis;

2) Anionic and non-ionic tensoactives - may cause nausea, vomiting and diarrhoea if swallowed and moderate to mild eye and skin irritation. The anionic tensoactives are toxic on inhalation if the product is in powder or spray. Aspiration may result in upper airway oedema and respiratory distress;

3) Hydrocarbons - are poorly absorbed from the gastrointestinal tract and do not cause appreciable systemic toxicity by this route but if inhaled are very toxic. They are moderate eye irritant and repeated exposure can result in skin irritation.

4) Hydramethylnon - are considered slight toxic. The routes of human exposure are ingestion and dermal contact.

Each product was evaluated to determine whether the recorded label information was adequate or inadequate. The information was considered inadequate if any statement was missing, incorrect or insufficient. Eleven statements were evaluated: 1) "keep out of the reach of children and domestic animals"; 2) "read the instructions before use" (these warnings should be present and highlighted on all labels); 3) inherent risks ("do not swallow", "do not permit contact with skin", "do not permit contact with eyes", "do not inhale"; 4) "do not reuse the container"; 5) "keep the product in original container"; 6) "wash the kitchen utensil used for measuring" (storage and usage instructions); 7) the first aid statement for ingestion; 8) the first aid statement for skin contact; 9) the first aid statement for inhalation; 10) the first aid statement for eyes contact and 11) "take the label to a health professional in case of accident".

Ninety labels randomly chosen by a draw were independently analysed by another research-

er. The coefficient of agreement (reliability) was measured by Kappa [k] statistics with the EPI-INFO 6.04 software.

## Results

Eighty-five products were analysed with cationic tensoactive (67 disinfectants, 18 softeners), 59 products with anionic tensoactives (19 detergents, 16 dishwashing detergents, 8 laundry detergents, 5 general purpose cleaners, 2 glass cleaners, 2 automotive detergents, 2 rug detergents, 1 oven cleaner, 1 soap, 1 soapiness, 2 automatic dishwashing detergents), 2 products with non-ionic

tensoactive (1 general purpose cleaner, 1 resin remover), 2 bleachers with sodium hypochlorite, 3 products with sodium hydroxide (oven cleaners), 2 products with hydrocarbons (2 floor cleaners), 1 disinfectant with formaldehyde, 1 disinfectant with phenol and 3 ant venom with hydramethylnon.

### Label information

Among the products analysed, only 5 (3.2%) were with adequate information concerning the toxicity of the product. The results are listed in Table 1.

**Table 1.** Proportion of inadequate labels concerning safety statements, by product category.

Safety statements	Cationic (N=85)	Anionic (N=59)	Non-ionic (N=2)	Hypochlorite (N=2)	Sodium Hydroxide (N=3)
Inherent risk of exposure	54	57	2	2	–
Keep in original container	34	49	1	1	2
First aid for inhalation	71	10	1	2	2
Warning concerning children	44	34	2	1	–
First aid for eye contact	28	52	–	2	2
Read the instructions before use	30	49	–	1	–
First aid for skin contact	31	45	–	–	–
Take the label to a health professional	34	40	–	1	–
First aid for ingestion	29	13	2	1	–
Wash the kitchen utensil	19	6	–	1	–
Do not reutilize the container	10	14	–	2	–

  

Safety statements	Hydrocarbon (N=2)	Formaldehyde (N=1)	Phenol (N=1)	Hydramethylnon (N=3)	Total (N=158)	%
Inherent risk of exposure	2	1	1	–	119	75.3
Keep in original container	2	1	–	1	91	57.6
First aid for inhalation	–	1	1	–	88	55.7
Warning concerning children	2	1	–	2	86	54.4
First aid for eye contact	–	–	–	2	86	54.4
Read the instructions before use	–	–	–	–	80	50.6
First aid for skin contact	–	1	–	–	77	48.7
Take the label to a health professional	–	–	–	–	75	47.5
First aid for ingestion	–	–	–	–	45	28.5
Wash the kitchen utensil	–	1	–	–	27	17.1
Do not reutilize the container	–	–	–	–	26	16.5

### **Statements about children and warning to read the instructions before use**

The statement “Keep out of the reach of children and domestic animals” was missing on 7 products (2 disinfectants with cationic tensoactive and 5 products with anionic tensoactives). On another 79 labels, the statement was not evident. The statement “Read the instructions before use” was missing on 80 labels (50.6%).

### **Warnings about inherent risks of the product**

One hundred and nineteen labels (75.3%) did not provide the necessary warnings or precautions to avoid the health hazards and injuries caused by an accidental exposure. Of these labels, 79 did not provide any warnings and, on another 40 labels, at least one of the potential routes of exposure was missing.

### **Storage instructions and use of kitchen utensils**

The instruction to keep the product in the original container was missing on 91 labels (57.6%). The warning “do not reutilize the empty container” was the least frequent irregularity, although consumers have not been alerted on this matter for products containing cationic tensoactives, anionic substances and sodium hypochlorite.

Twenty seven products with hypochlorite, formaldehyde, cationic and anionic tensoactive, which recommended the use of a glass or spoon to measure with, did not alert the need to wash the utensils after use.

### **First aid instructions**

The most frequently missing information was on exposure hazards due to inhalation. This information was missing on 88 (55.7%) products that contained active toxic agents if inhaled. The first aid instruction to eye splash was missing on 9 labels and 76 labels did not provide the necessary time of washing eyes for effective decontamination. One product had the incorrect information because it recommended washing the eyes with soap. For skin contact, the instructions were missing on 77 labels (48.7%) although the active agents may cause irritation and contact dermatitis. In case of ingestion, 43 labels were considered inadequate because they recommended diluting the product by drinking abundant water or milk and 2 labels because they recommended provoking prompt vomit. This recommendation occurred on products with irritant active agent to mucous such as cationic tensoactives, anionic tensoactives

and sodium hypochlorite. The recommendation to take the label to a health professional in case of accident was missing on 75 (47.5%) labels.

The results of the final classification of the labels analysed by the two researchers were in 100% agreement and the Kappa coefficient was 1.0.

### **Number of irregularities**

Almost all labels presented at the least one irregularity involving safety statements that were missing, incorrect or insufficient. The mean number of irregularities was 5.1 (range 0 to 10; S.D. 2.4). Most labels had more than one type of irregularity (Table 2).

### **Discussion**

Several authors have described that labels are not a good source of toxicological information since they do not provide consumers with complete and correct information on first aid. Besides, the warning statements on avoiding accidents are not present either<sup>9,12,15,16</sup>.

In our study, the incidence of inadequate labels was higher than described by others authors<sup>12,16,17</sup> due to the kind of products and the statements evaluated.

Unintentional poisoning with household cleaning products occurred mainly with children probably because the containers are located at floor level. Besides, the products were frequently not maintained in their original containers<sup>1,2,7,8,9,11</sup>. In Brazil, legislation requires that these products must have the statement “to keep out of reach of children and pets” highlighted, since if the product could be taken by a pet, it could be taken by a child too<sup>18</sup>. Frequently, cleaning products are stored under sinks in kitchens, on the ground in backyards or on the floor in bathrooms. So manufactures must provide the necessary warnings to keep the container out of the reach of children and to keep products in their original container. In our study, the warning concerning children was considered adequate only if the sentence was complete and highlighted.

Since the lack of knowledge concerning the toxicity of products by parents is one determinant factor of unintentional poisoning in children, it is necessary to alert people to read the instructions before use<sup>9,19</sup>.

Incomplete information was a problem for the statements of the potential health hazards. Manufactures do not provide warnings of all

**Table 2.** Distribution of labels by type and number of irregularities.

Number of irregularities	Number of products n (%)	Inherent risk of exposure	Keep on original container	First aid for inhalation	Warning concerning children	First aid for eye contact
0	5 (3.2)	—	—	—	—	—
1	8 (5.1)	6	—	1	4	1
2	13 (8.2)	16	5	8	4	—
3	21 (13.3)	15	10	14	4	6
4	22 (13.9)	8	5	14	12	8
5	10 (6.3)	23	20	8	4	7
6	26 (16.5)	24	24	10	15	19
7	26 (16.5)	14	14	12	19	17
8	14 (8.9)	12	12	13	12	15
9	12 (7.6)	1	1	7	11	12
10	1 (0.6)	119	91	1	1	1
Total	158 (100)	10		88	86	86

Number of irregularities	Read the instructions before use	First aid for skin contact	Take the label for a health professional	First aid to ingestion	Wash the kitchen utensil	Do not reuse the container
0	—	—	—	—	—	—
1	—	1	—	1	—	—
2	2	—	—	5	1	1
3	2	1	4	6	3	—
4	4	6	3	9	3	—
5	8	4	3	3	4	2
6	19	18	21	5	2	4
7	22	20	20	3	5	4
8	10	14	11	4	7	6
9	12	12	12	8	2	8
10	1	1	1	1	—	1
Total	80	77	75	45	27	26

possible types of exposure. Hurst<sup>16</sup> explained that the manufacture's opinion is that the label should only contain a warning concerning the primary hazard, but legislation requires the presence of each specific hazard on the label.

Labels should be providing the correct first aid instructions for accidents mainly for ingestion which is the most common form of unintentional poisoning<sup>7,8</sup>. The majority of labels evaluated recommended drinking abundant water or milk, but this procedure may prompt vomiting which is inadvisable in most cases because it could provoke aspiration. The emergency medical treatment recommended by Posindex orients to im-

mediately drink 240 ml of water or 120 ml for a child (in order to dilute the toxic substance already ingested), not exceeding this quantity and to drink slowly.

Other important first aid information is to alert people to take the label or the container if medical care is required. This information was missing on almost 50% of the products studied. There is a large range of cleaning products on the market and health professionals can not be expected to know the active agents of all of them.

Generally, the label designs are very confusing. There is a lot of advertising whereas the safety instructions are printed in small size, frequently

on the back of the product. It is common practice that the safety information is separated from the usage instructions<sup>10,20</sup>. Although Hancock *et al.*<sup>21</sup> described that the comprehension of the warning information is influenced by age, memory and other factors, the manufacturer is responsible to provide this information on the label.

## Conclusion

This study concludes that the labelling of cleaning products used at home by the population in general does not provide enough information on the inherent toxicity of these products.

Although unintentional poisoning has low mortality, it accounts for high morbidity that can be prevented through knowledge of the danger.

Manufacturers should be responsible for providing information on the toxicity of their products on the labels and the governments should be responsible for compelling manufactures to label their products correctly as well as instructing the population to read and follow the warnings on the labels.

## Collaborators

R Presgrave was responsible for the planning and execution of the study and the writing of the final text. EM Alves analyzed the labels for the reliability evaluation of the results. LAB Camacho and MHSVillas Bôas discussed the results and wrote the final text.

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Artigo apresentado em 14/06/2006

Aprovado em 17/05/2007

Versão final apresentada em 26/06/2007