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Occupational Chemical Exposure in the Urgency of a Hospital Area Public of Cartagena de indias (Colombia)

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Abstract : This study identified occupational exposure by chemical agents in the emergency area of a public hospital in the city of Cartagena de Indias. The research is descriptive, it has been estimated the degree of danger, by the simplified method of chemical risk of the National Institute of Research and Security (INRS); Absorption pathways of the INSHT Guidelines for the assessment and prevention of occupational hazards in workplaces related to chemical agents GTAQ of the National Institute for Occupational Safety and Health at Work INSHT and health effects through the structured interview Of the Trade Union Institute of Work, Environment and Health (ISTAS).The chemicals with the highest degree of danger that is the substance with the highest incidence of sodium hypochlorite, with a score of> 1000. The mayor's route of exposure is via and inhalation. It is concluded that the knowledge is related to the exposure and the handling of the chemical agents in the area of work and its consequent damages in the health is low.
Keywords : Health centers, Chemical hazards, Occupational health, Toxic.

Introduction

Hospitals are a complex work environment, covering a multitude of tasks, activities and processes with very different risks. As a result of this complexity, the worker who carries out his work in this environment is exposed to different chemical agents, directly or indirectly, throughout his professional life[1,2] Chemical hazards play an important role in hospital services, since staff can absorb chemicals during handling or stay close to them. Anesthetic gases, antiseptics, manipulation of cytostatic drugs, drugs and pharmaceutical preparations can cause biological effects on the worker, depending on the concentration, handling, exposure, susceptibility of the worker, the agent and the protection practice adopted by the personnel[3,4].

The variety and intensity of use of chemicals in the health sector has increased exponentially, making it difficult to assess the health risks faced by hospital workers, due to the multi-exposure due to the use of various chemical agents in their work environment to extra-occupational factors. These include chemicals from the general environment, domestic, derived from hobbies, medication and lifestyles[5,6].

The risk generated by the lack of information is compounded by insufficient compliance with regulations, bad practices, labeling errors and safety data sheets provided by manufacturers, lack of training or difficulties in interpreting labeling by Part of the workers and users, the combined use of different substances

risk by multi-exposure, mixtures of chemical agents carried out in the company itself, labor precariousness, toxic already existing in the workplace, generated in other productive activities or the emergence of new substances[7,8,9].

Therefore, knowledge of these effects is essential to prevent and control the risks of chemicals. The rapid development of medical and biological science has facilitated the long-term study of the consequences of human exposure to a wide variety of contaminants in the air, water, soil, food, or at work; But uncontrolled exposure of groups of workers to chemical agents of unknown hazards has not been prevented. The consequences have been the occurrence of work-related diseases[10,11]. The objective of this work was to identify labor exposure by chemical agents in the emergency area of a public hospital in the city Cartagena de indias.

Experimental

The research is descriptive and was developed with information obtained through 100 workers in the emergency area of a public hospital in Cartagena, of which 65 are nursing auxiliaries and 35 general services, tests were developed within the day Work shift in the morning and afternoon shifts for ten consecutive weeks.

Estimation of degree of danger

An inventory of chemicals was carried out using the simplified chemical risk method Institute National de Recherche et de Securite (INRS), detailing the product reference, amount used, frequency of use, area of work, label information (pictograms, Risk phrases) and technical data sheets. In this, a previous stage of screening was carried out to filter the unacceptable situations that require the immediate adoption of measures and establish the order of priority for the subsequent evaluation. Allowing a detailed report, ranking in descending order the degree of danger, depending on the hazards and the potential exposure.

Identification of absorption pathways

Using the GTAQ "Guide to the assessment and prevention of occupational hazards in the workplace related to chemical agents" of the National Institute for Occupational Safety and Health INSHT, it was identified, localized, quantified, evaluated and planned, through A matrix of exposure to chemicals from the bibliographies consulted, observation and revision of the safety data sheet and labels of substances with greater use. This allowed the quantity, the frequency of use, the routes of entry to the organism and the permissible limit values of the most used chemical substances in the place under study to be known, with a view to planning corrective measures regarding the handling of chemicals.

Determination of health effects

The observation and the structured interview of 40 items according to the Trade Union Institute of Labor, Environment and Health (ISTAS) were carried out, the workers' knowledge of the exposure to chemical risk was investigated. With the aid of clinical records and indicators Absenteeism sought an associativity between knowledge of the substance and pathologies in workers.

Results and discussion

Hierarchy of chemical agents

The risk score (PR), the exposed surface (SE) and the frequency of exposure (FE) could be evidenced by means of three variables, such as the risk score is allowed to characterize in the following way. PR x SE x FE = risk characterization, where if the PR is> 1000 I must take urgent control measures[12]. In Table 1, it is shown that the sodium hypochlorite score is> 1000, as its result is 10,000. This indicates that immediate corrective actions should be taken, hypochlorite being a dense yellowish-yellow gas at room temperature and pressure, with an irritating and pungent odor, it was determined that exposure levels should not exceed 0.5 ppm (1.5 mg / m 3), Given that their effects are related to the concentration in air, so the degree of toxicity is considered to be acute causing irritations at the eyes, skin and upper respiratory tract[13].

Table 1. Results of risk characteristics

Agent Frequency	Phrase of danger	T.L.V	Hazardclass	Hazard rating	Exposedarea	Frecuency	Total
5% sodiumhypochlorite	R. 31-34	Notestablished	3	100	10	10	10.000
Mercury	R: 23-33 50/53	R: 23-33 50/53	4	1000	10	1	10.000
Hydrogenperoxide	R- 31-34	1ppm	3	100	2	2	400
Iodo	R: 20/21-50	0.1ppm	3	100	2	2	400
Alcohol Isopropyl (supra gel)	R- 11-36-67	200ppm	2	10	3	2	60
Ethyl alcohol	R:11	1000PPM	1	1	3	2	6

Similarly, it should be noted that the mercury yielded a result of 10,000 which indicates the immediate corrective action for this toxic metal, taking into account that this toxic causes acute effects on the health of people causing pneumonitis, pulmonary edema, Diarrhea, vomiting and bleeding[14]. Isopropyl alcohols (supra gel) gives a score of 60, this result tells us that it is a low risk a priori (that does not need modifications). According to Ribeiro[15], this chemical is highly flammable and its effects are acute, causing redness in the skin, blurred vision on contact with the eyes, inhalation causing a throat burning, cough headache, dizziness, nausea and vomiting.

Routes of absorption of the chemical substances

According to the chemical matrix of ISTAS, according to the exposure time and the permissible limits, the toxic will be absorbed or entered by the different routes of absorption. It is also worth mentioning that some routes such as the digestive and parenteral are not very frequent as these are caused by a work accident and ingestion of the chemical. The study shows that the route of greatest exposure is the dermal and inhalation routes, factors that affect the skin absorption of toxic substances comprise, from the state of the skin, the chemical constitution of the substance. In the inhalation route, the factors affecting the inhalation of toxic substances are the concentration of the substance in the atmosphere, the solubility of the substance in the blood and tissues, the state of the respiratory system, and the size of the toxic particle. The distribution of the studied population according to the chemical substances and the use is mentioned in Table 2, mentioned the analgesic agents, antibiotics, corticoid, anti-inflammatory, preparations, anesthetics and antiseptics to which the workers are most exposed. Likewise, the training of personnel in risk management is expressed.

Table 2. Distribution of the studied population according to the chemical substances and the use

	Frecuency			
Agents	**Bit**		**Much**	
	N	%	N	%
Antiseptics				
Sodium hypochlorite			6	27.2%
Hydrogen peroxide			4	18.1%
Chlorhexidine	10	45%		
Iodo	0	0%	16	72,20%
Quiruger			22	100%
Isodines			16	72.7
Glutaraldehyde	6	27.2		
Quiruxidal	22	100%		
Alcohol			16	72.7%

Supra gel			22	100%
Nitrous oxide	NA	NA	NA	NA
Aniosur			6	27.2
Anesthetics				
Fentanyl	10	45%		
Lidocaine 2%			10	45%
Midazolan			10	45%
Thiopental	NA	NA	NA	NA
Halonate	NA	NA	NA	NA
Xylophones			16	72.7%
Muscle relaxants				
Vecuronio	10	45%		
Analgesic				
Dipyrone			16	31,70%
Diclofenac			16	27,30%
Tramadol			16	29,30%
Morphine			10	11,70%
Meperidine	10	45%		
Antispasmodics and antiemetics				
Antispasmodics and antiemetics	N	%	N	%
Metoclopramides			16	72.2%
Ranitidinas			16	72.2%
Buscapinas			16	72.2%
Aluminum hydroxide	16	72.7%		
Antibiotics				
Cephradines			16	72.2%
Ampicillins			16	72.2%
Amoxicillin			16	72.2%
Corticoid and anti-inflammatory				
Dexametazone			16	72.2%
Hydrocortisone			16	72.2%
Betamethasone			16	72.2%
Preparations				
Ethanol	NA	NA	NA	NA
Violet crystal	NA	NA	NA	NA
Potassium hydroxide	NA	NA	NA	NA
Mercury			6	27.2%
Cidex			22	100%

The most commonly reported analgesic is dipyrone (31.7%). This result confirms the findings of Montoya et al[16], where it appears among the most used anesthetics, with a 31.8% frequency, in Brazil. Among the 6 most mentioned agents are alcohol (72.7%) and chlorine (27.3%). This latest sodium hypochlorite is used as a cleaning and disinfection agent in a high proportion. In addition, of the 6 people who use it, none were trained in risk management and adverse effects. Among the substances investigated are preparations containing

mercury Hg. The result of how the Hg is handled in the event of a thermometer or tensiometer rupture was expressed in 9 different ways, none of which satisfies the respective standards. Tensiometers continue to be a matter of concern because of their significant Hg content (between-80-100g / unit) compared to thermometers (-1g / unit) and consequently involves a much greater danger in the event of an accident[14].

Health effects from handling chemicals

The level of knowledge and training in the management of chemical substances by hospital emergency personnel is detailed below, in Table 3, it shows the association between training and knowledge of handling of chemical substances, the results found coincided with the study Carried out by Da Silva[17], where workers with 72.0% did not have sufficient knowledge regarding the exposure and management of the chemical agents present in the work area and their consequent damages in health, ignoring the contents of the tokens Techniques and labeling of these in their 100%; So there are difficulties in the training and prevention process.

Table 3. Association between training and substance management knowledge

Variables	Yes	No
Know the handling of chemicals	72	28
	72.0%	28.0%
Know the different ways of absorption / penetration in the body of chemical contaminants	86	14
	86.0%	14.0%
Check before using chemical labels and safety data sheets	0	100
	0%	100%
Know the health effects of the chemicals you handle	68	32
	68.0%	32.0%

The inappropriate use of these substances can cause serious damage to health, developing pathologies such as; Irritation of the mucosa of the nose and throat, causing allergic pictures and even lung damage when inhaled; Skin contact may cause irritation, redness, pain, skin burns or dermatitis; Contact with the eyes can cause severe deep burns, blurred vision and damage to the cornea[3]. It also altered the respiratory system producing respiratory difficulties, alteration in the pharynx, larynx, and in some cases causing cardiorespiratory arrest, without overlooking other target organs that may be affected[18]. Prolonged exposure to these chemicals can lead to fatigue, gastrointestinal disturbances and effects on the nervous and renal systems[8]. Clinical charts show a series of common illnesses and other injuries caused by work-related accidents, not related to the chemicals used.

Implement controls and measures to strengthen the safety of processes taking into account the principles of current legislation, implement the implementation of the best strategies of prevention and mitigation that control adverse events and accidents with the presence of chemicals and toxic in the health sector industry[19]. Documented fatalities in the chemical industry demonstrate the need to implement the variety of safety protocols with preventive fines as indicated Bhattacharya & Ganesh[20,21]**.** In its study on safety and consequence analysis[22].

Conclusions

From the results obtained, the following conclusions can be drawn: 1) According to the hierarchy of the chemical substances it was determined that the substances with greater degree of danger is sodium hypochlorite, it becomes necessary to train the workers in the management of Chemicals emphasizing the use, quantity, frequency, time of exposure, storage, handling of safety data sheets and labeling of containers; 2) Effective control for disease prevention is based on the participation of workers, through knowledge of the hazards of chemicals, a self-care program at work is recommended from the intervention plans of the model Dorothea; His theory raises that the care is promoted and its autonomy and appropriation of the care of its health is fomented.

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