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SYMPTOMS IN HEALTH PERSONNEL EXPOSED TO DISINFECTANTS

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ABSTRACT

Background: While the biocidal efficacy of disinfectants available for use in health facilities has been widely investigated, little attention has been paid to their potential side effects to users.

Objective: To describe the occurrence of symptoms attributable to occupational exposure to disinfectants with emphasis on glutaraldehyde.

Design: Exploratory cross-sectional study.

Setting: Kenyan health facilities.

Subjects: One hundred and fifteen members of various health cadres.

Results: All the respondents reported using disinfectants. Glutaraldehyde-based preparations, either alone or alongside other agents (excluding hypochlorite), were used by 52.2% of the respondents. Hypochlorite-based preparations, either alone or alongside other agents, were used by 18.3%, while cetrimide preparations and ethanol alongside other agents were used by 13% of the respondents. More than sixty two per cent of the respondents had suffered one or more symptoms during the use of these disinfectants. Among the users of glutaraldehyde preparations, the most common symptoms reported were sneezing (38.3%), headache (31.7%), watering of eyes (25%), skin rash (10%) and chronic cough (8.3%). Among users of hypochlorite and cetrimide preparations, the most commonly reported symptoms were sneezing, headaches and watering of eyes.

Conclusions: Our findings suggest possible occupation-related adverse reactions that may be attributed to the use of disinfectants. Awareness of these potential hazards needs to be increased among users and efforts made to introduce techniques to minimise exposure to liquid and vapourised disinfectants. Further studies involving larger sample sizes, are necessary to unequivocally apportion the various symptoms to specific disinfecting agents.

INTRODUCTION

Increasing concern in the control of cross-infection, especially with the advent of HIV infection, has led to endorsement for the use of high-level disinfectants and chemosterilisation substances in particular glutaraldehyde and hypochlorites in clinical settings(1-9). However, while the biocidal efficacy of these disinfectants has been widely investigated(7-11), little emphasis has been paid to their potential side effects to the users. In this regard, recent observations among staff in a health facility in Kenya have suggested possible glutaraldehyde-related adverse reactions(12). These were severe enough to warrant seeking of medical attention and/or withdrawal of the affected staff from their working environment (Table 1). Consequently, given the implication of such reactions regarding health personnel placement and

performance of duties in clinical settings, it is imperative that symptoms associated with such adverse reactions and the agents responsible be identified and their occurrence prevented.

The purpose of this study was to examine the occurrence of symptoms attributable to occupational exposure to disinfectants among health personnel in some Kenyan health facilities and units. Emphasis was placed on the adverse reactions associated with the use of glutaraldehyde.

MATERIALS AND METHODS

This was an exploratory cross-sectional study involving various health cadres from different health facilities and units. Respondents were interviewed using a structured self-administered questionnaire regarding sterilisation and disinfection procedures in their health facilities, type of disinfectants used,

symptoms suffered at their place of work, their possible cause, and remedies sought. In order to estimate the level of significance of association between the use of glutaraldehyde and each of the various symptoms, the frequency of occurrence of symptoms in users was compared with that in non-users. Chi-square (χ^2) tests of significance were performed from 2 x 2 tables with one degree of freedom and Yates correction for continuity. Statistical significance was accepted at 5% level.

RESULTS

A total of 115 health personnel, among them dental surgeons (45%) and various cadres of nurses (33%), responded. All the respondents reported using more than one disinfecting agent. Among these respondents, glutaraldehyde alongside other agents, excluding hypochlorite, was the most frequently used (52.2%), while the latter alongside other agents was used by 18.3% of the respondents. (Table 2).

Table 1

Details of the affected respondents

Case Sex/Age (yrs)	Job	Symptoms and signs	Relief followed/history
M/40	Doctor	Itching and watery eyes, sneezing, periorbital swelling	Withdrawal from practice. 1% hydrocortisone cortisone cream Allergy to tetracycline
M/36	Nurse	Itching and watery eyes, Headaches, Nausea	Withdrawal from location
M/41	Nurse	Headaches, itching eyes, multiple skin swelling (forearm), coughing breathlessness and wheezing.	Allergy to penicillin and dust. Similar adverse reactions with formaldehyde
M/40	Nurse	Itching eyes Acute rhinitis Non productive cough, Recurrent breathlessness wheezing bronchitis	Synthetic antibiotics and antihistamines, withdrawal from practice, allergy to dust and firewood smoke
F/36	Doctor	Itching and watery eyes Nasal irritation	Withdrawal from location Allergy to chloroquine

Table 2

Distribution of respondents according to the type of disinfectants used

Disinfectant	No. of users	% of respondents (n=115)
Glutaraldehyde alongside other agents (excluding hypochlorite)	60	52.2
Hypochlorite alongside other agents	21	18.3
Cetrimide preparations alongside ethanol and other agents (excluding glutaraldehyde and hypochlorite)	15	13.0
Other agents	14	12.2

Table 3

Causes of symptoms as perceived by respondents

Cause	No. with symptoms	% of all respondents with symptoms (n=72)
Glutaraldehyde vapour	15	20.8
Gloves powder	15	20.8
Dental materials and other related causes	13	18.1
Dust	7	9.7
Injections	4	5.6
Other chemicals and drug inhalation	4	5.6

Table 4

Distribution of symptoms by type of disinfectant used

Symptom	Glutaraldehyde (excluding hypochlorite) users (n=60)		Hypochlorite (excluding glutaraldehyde) users (n=21)	
	No.	As % of users	No.	As % of users
Watering eyes	15	25	7	33.3
Sneezing	23	38.3	11	52.4
Headaches	19	31.7	6	28.6
Skin rash	6	10.0	3	14.3
Skin swelling	1	1.7	1	4.8
Contact dermatitis	2	3.3	4	19.1
Chronic cough	5	8.3	3	14.3
Breathlessness	3	5.3	2	9.5

The most common symptoms reported included sneezing, headaches, watering of eyes, skin rash, chronic cough, breathlessness and contact dermatitis. Seventy two (62.7%) of the respondents reported having suffered one or more of these symptoms. Among these respondents, 34.7% had sought treatment. The most common factors incriminated by the respondents with these symptoms (Table 3), were glutaraldehyde vapour (20.8%) and glove powder (20.8%). Among both users of glutaraldehyde and hypochlorite preparations, the most common symptoms reported were sneezing, headaches and watering of eyes (Table 4).

Table 5

Association between the various signs and symptoms and the use of glutaraldehyde

Symptom	Ever used glutaraldehyde		χ^2	p value
	Yes	No		
Watery eyes	Yes	16	0.28	0.597
	No	7		
Sneezing	Yes	29	1.945	0.163
	No	15		
Headaches	Yes	21	0.271	1.991
	No	10		
Skin swelling	Yes	1	0.002	0.459
	No	1		
Skin rash	Yes	7	0.026	0.585
	No	2		
Contact dermatitis	Yes	6	0.137	0.662
	No	2		
Chronic cough	Yes	7	0.002	0.494
	No	3		
Breathlessness	Yes	3	0.811	0.180
	No	3		

Among the symptoms reported by users of these agents, only skin lesions were not reported by users of cetrimide preparations while watering of eyes, skin swelling, contact dermatitis, chronic cough and breathlessness were not reported by any of the users of other agents such as methylated spirits. With regard to onset, 20.8% of the respondents with symptoms claimed to have developed them when they started using glutaraldehyde. No statistical significance was demonstrated with respect to association between the various symptoms reported in Table 4 and the use of glutaraldehyde (Table 5). However, it was not possible to desegregate the effect of glutaraldehyde from that of other disinfectants.

DISCUSSION

The symptoms reported by respondents in this study are consistent with adverse reactions to disinfectants (5,12-16). Our findings suggest that these symptoms are common (62.7%) among the health personnel studied and support our earlier report calling for greater attention to disinfectant related occupational hazards (12). Since all the respondents in our study reported using more than one disinfectant, it was not possible to unequivocally apportion particular symptoms to specific agents. However, given that the reported symptoms were suffered at the health facilities by personnel who used disinfectants, it seems most probable that the majority are attributable to exposure to these agents.

The symptoms reported by glutaraldehyde users (Table 4) are to a large extent similar to those previously observed among some health personnel in a Kenyan health facility and which were attributed to exposure to glutaraldehyde (12). In addition, symptoms such as watering of eyes, chronic cough, breathlessness, headache, contact

dermatitis and skin rash reported by users of this agent have also been reported to be provoked by exposure to formaldehyde (13,14). It is therefore significant that 20.8% of respondents associated the symptoms suffered with glutaraldehyde vapour while a similar proportion reported to have first developed the symptoms when they started using this agent. Our failure to demonstrate statistical significance in the association between the various symptoms and the use of glutaraldehyde may be attributed to, among other factors, our study design, sample size and inability to disgregate the effect of glutaraldehyde from that of other disinfectants.

Reactions to disinfectants may follow direct bodily contact with the liquid agent or exposure to vapours from vapourisable agents. In our study, the nature of the most frequently reported adverse reactions and organs affected suggested that exposure to vapours is more important than direct bodily contact with liquid disinfectants. Since vapourisation of disinfectants is influenced by temperature changes among other factors, then variation in the frequency of symptoms from one season and temperature zone to another needs to be investigated further. In addition, the extent to which some of these reactions may be related to hypersensitivity to disinfectants, rather than dose dependent direct irritation as suggested in previous reports (12,14-15,17-19), needs to be determined.

Some previous observations indicated that reactions to disinfectants can be severe enough to necessitate medical intervention (12,14). In our study 34.7% of those affected had sought medical treatment. In addition, such reactions can lead to disruption of health manpower organisation and performance in a risk-environment (12,14,20). It is therefore, necessary to raise awareness regarding disinfectant related occupational hazards among health personnel (20,21). In furtherance of this, we have previously pointed out the inadequacy of precautionary details given by manufacturers regarding the use of glutaraldehyde (12). This is of great concern, especially given that glutaraldehyde is presently claimed to be the best biocide agent for high-level disinfection and cold sterilisation with no feasible substitute (20).

Among users, the routine adoption of basic precautionary and protective measures, among them adequate ventilation especially in sterilisation and treatment rooms, use of protective hand gloves, protective face masks and eye wear to reduce airborne agents with irritating vapours during disinfection of exposed surfaces and equipment, should be emphasised.

However, controlled studies involving larger sample sizes, are necessary to unequivocally apportion the various symptoms to specific disinfecting agents. In addition, efforts should be made to design techniques of eliminating direct exposure to liquid and vapourised disinfectants especially in tropical climates. Finally, consideration should be given to the design of simple procedures for regular monitoring of threshold limit values of risk agents used in busy clinics, wards, theatres and high risk areas such as intensive care units.

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