

Do students of nursing and emergency medical services are ready for action in terms of chemical contamination?

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Summary

Background. The aim of this study was to assess the knowledge of third year students of nursing and emergency medical services on emergency measures in the event of chemical contamination.

Methods. An anonymous survey was mailed to 350 randomly selected students of nursing and emergency medical. Return Questionnaires were Obtained at 82.8%. The survey included questions Concerning the process of decontamination, toxidromes knowledge, and the use of selected antidotes.

Results. Poorly known were all issues to deal with chemical contamination, especially: decontamination technique (from 5.4% to 32%), the use of antidotes (from 2.9% to 72%), toxidromes knowledge (from 5.0% to 64%).

Conclusions. Students of medicine do not have enough knowledge for dealing with chemical contaminations. It is necessary to introduce mandatory training within the study of emergency measures in contaminations. High self – knowledge of the proceedings in chemical contaminations among nursing students is disproportionate to their actual knowledge

Key words: blood-borne, protection, knowledge, students, medical, chemical disaster.

Background

Twenty-first century is the century of intense activity of terrorist groups. In the past year we have witnessed EURO2012 in Poland and Ukraine. Such a large sports event was preceded by a year to prepare for action in the event of adverse conditions – is meant by these terms of mass accidents, including also caused by terrorist attacks. Today, terrorists have a huge range of resources, which can be used during the attack [1,2]. It's not only conventional pyrotechnics, but also biological weapons, radiation as well as chemical. An example of the use of toxic warfare agents may attack in the Tokyo subway conducted 20 March 1995 by a Japanese religious sect

Aum Shinrikyo [3]. During the morning peak traffic, just after 8 am, members of the sect in Tokyo spray sarin subway trains. As a result of this attack killed 12 people and more than 5 thousand were injured [4]. This is just one example of the use of chemical substances for the purposes of assassination. It should be remembered also that the development of the industry also carries the risk of failure, including loss of containment tanks that store hazardous substances such as ammonia or chlorine. In such cases, the medical staff must demonstrate the proper knowledge and caution in order to protect the patient and to avoid danger to himself.

In the scientific literature, there is no scientific reports circulating substantive issues to prepare medical students to provide assistance in the event of chemical contamination. Therefore, the author considers reasonable attempt to assess students' knowledge III nursing and emergency medical services on the procedure in the case of chemical contamination.

Material and methods

The study was conducted among students of nursing and emergency medical services from October to November 2013. The survey was distributed to 350 people, the level of returns correctly filled surveys was 82.8%. The study included 290 people. For the purposes of research developed a special questionnaire. The first part of the survey contained data: age, gender, field of study. The second part of the survey contained 15 questions relating to proceedings during chemical contamination.

Group I consisted of 240 third-year students of nursing (G1), and 50 third-year students towards the medical emergency was a group II (G2). Respondents were aged 21-42 years (mean: 26 years). 83% of the respondents were women (n=242), while men accounted for 17% of all respondents.

The research material was coded in MS Excel 2010 and developed using the Statistica 8.0. The results are presented in the form of numbers, percentages or percentage of the median. For the analyses used Student's t-test and Wilcoxon test. Results were considered statistically significant at $p < 0.05$.

Results

At the outset, the survey asked respondents persons with self – knowledge of the proceedings in the case of chemical contamination. Respondents could choose in the responses from 1 to 5, where “1” meant a lack of knowledge, and “5” full knowledge. The average level of self-esteem of all respondents was 4.2 point, and most people found their knowledge of group I (nursing students) 4.39 point, while those in group II (students of emergency medical) assessed the level of their knowledge on 3.3 points (Figure 1). The differences in self-esteem in each group were statistically significant ($\chi^2 = 34.26784$, $p = 0.0000$).

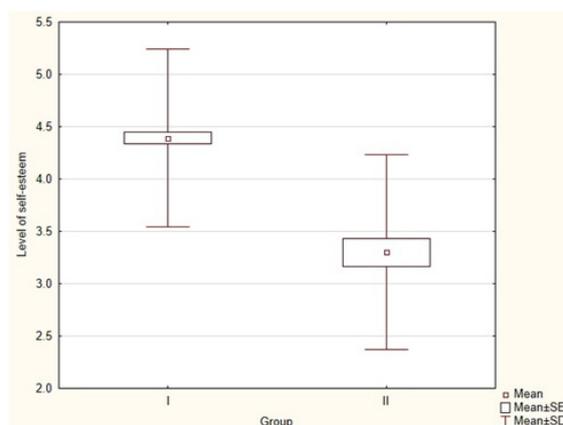


Figure 1: Self-assessment knowledge concerning emergency management of chemical contamination.

Knowledge of concepts toxidrome boasted a 11.3% of the group and 34% of those in group II. Reported differences were statistically significant ($p = 0.000$).

Knowledge of the external decontamination of the patients concerned contaminated by chemicals 5.4% of the Group I and 32% of patients in Group II. Sodium hypochlorite as one of the primary means of decontamination indicated 7.2% of respondents, respectively, in the group I – 2.1% and 32% of patients in Group II.

In Table 1 presents the results on the appropriate use of antidotes by the respondents.

Table 1: Correct responses about the usage of antidotes.

Medicines / anti-dotes	Group I		Group II		Kruskal-Wallis test
	N	%	n	%	
Atropine	32	13.3	36	72	$p = 0,000$
Methylene blue	11	4.6	12	24	$p = 0,000$
Calcium chloride	11	4.6	15	30	$p = 0,000$
Flumazenil	17	7.1	22	44	$p = 0,000$
Hydroxycobalamin	7	2.9	19	38	$p = 0,000$

Table 1 shows the analysis that the most knowledgeable people have studied in the application of atropine (23.4%) and flumazenil (13.4%), while the worst has resulted in knowledge of the correct application of methylene blue (7.9%), hydroxocobalamin (9.0%) and calcium chloride (9.0%). It was found that the most knowledgeable in the use of antidotes students had medical emergency ($p = 0.000$).

Table 2: The connection between chosen chemicals and clinical signs.

Chemical weapons – toxidromes	Group I		Group II		Kruskal–Wallis test
	N	%	n	%	
Cholinergic	21	8.8	21	42	p =0,000
Irritating	17	7.1	11	22	p =0,000
Chopping	29	12.1	9	18	p =0,000
Depressing	33	13.8	14	28	p =0,000
Cholinolytic	12	5.0	13	26	p =0,000
Corrosive	26	10.8	32	64	p =0,000

Table II shows the knowledge of individual research groups on the relationship between selected chemical substances, and not caused by teams of clinical symptoms.

Analysis of the results in Table II indicates that the respondents had the greatest knowledge of the symptoms characteristic of corrosivity toxidrome (20.0%), depression (16.2%), cholinergic (14.5%), choking (13.1%), irritation (9.7%), and anticholinergic (8.6%). toxidrome characteristic symptoms cholinergic (22.7%), caustic (22.2%) and an anticholinergic (20.2%). Differences in knowledge in groups showed statistical significant differences ($p < 0.01$).

Table 3 shows the correlations between selected sociodemographic variables and set the parameters on knowledge of the proceedings in chemical contaminations.

Table 3: Correlation between gender, age and field of study and selected the timers associated with the proceedings of chemical contaminations.

Variable	Gender	Age	Field of study
Selfesteem	0.17	-0.21*	0.29*
Knowledge of specific antidotes	0.17	0.23*	-0.25*
Knowledge of toxidromes	0.07	0.17	-0.23*
Knowledge of conduct intoxication ammonia	0.19	0.4	-0.22*
Knowledge of conduct sarin poisoning	0.21*	0.32	-0.25*
* $p < 0.05$			

In the case of variable sex positive correlation was observed only in relation to the knowledge of the proceedings in sarin poisoning. More knowledge on this subject showed the men than the women. The variable age corresponded to the level of self-esteem as well as knowledge of specific antidotes, and the self-esteem was higher in younger patients, and greater knowledge of antidotes have elderly. The variable “field of study” correlated with self-esteem of the respondents, knowledge of specific antidotes, toxidromes knowledge, knowledge of the proceedings in ammonia and sarin poisoning. All variables correlated positively with the field of study – a medical emergency.

57.2% of respondents (respectively 50.8% of group I, 88% – in group II) confirmed the need for a systematic training courses for medical staff to actions during chemical contamination. Interest in the theoretical and simulated exercises in the field of chemical contaminations of conduct declared by 44.6% of nursing students and 98% of students in emergency medical services.

Discussion

Chemical contamination arising either from deliberate actions which are terrorist attacks or negligence and the resulting failure thus constitute a serious challenge for departments and rescue services [1,5]. The key action taken by rescue personnel during such events is to provide medical assistance possible to the greatest number of people while limiting the spread of contamination [6,7].

To do that and not be contaminated by yourself – the person providing the assistance should have adequate preparation.

Students of medicine, including nursing and emergency medical services as future students of these professions must possess knowledge of effective emergency procedure in every possible situation already in the course of their studies. So that after the operation were able to demonstrate due care when professional activities. Especially dangerous for medical staff is secondary contamination through improperly conducted decontamination of patients, staff and medical equipment.

Unfortunately, studies show students the third year of nursing and emergency medical services do not have adequate knowledge of the conduct of rescue operations in case of chemical contamination. Burda et al in their study showed a lack of knowledge of doctors in the field of chemical contaminations procedure [6], while Mitchell et al. indicate a lack of knowledge among nurses [8]. The above examples demonstrate that the lack of adequate preparation during the study also results in a deficit of knowledge in the course of work. And the lack of knowledge may relate to the same extent, both doctors, nurses and paramedics. It should be noted that other authors point to the low level of the medical staff to act in the event of chemical contamination [3,9,10].

As the study Karayilanogku, Baker and Okumura major problem during rescue operations in case of chemical contamination is the phenomenon of the so-called. secondary contamination, which refers both to the patients themselves as well as those carrying them help [4,11,12]. Thus, the key element is the knowledge of decontamination of patients [5].

Some researchers book decontamination procedures only for pre-hospital services , but the terrorist attack in Japan using sarin showed that hospital staff must also be prepared to take substantively decontamination process [4,5,13,14]. This fact is confirmed by the requirements of the National Health Fund , according to which in every hospital emergency department must be room decontamination. Our study showed that knowledge of the proceedings in the case of sarin poisoning had 11% of respondents and in case of poisoning with ammonia 17% of respondents. These results were lower than the results obtained by the research team Burda, in which the proceedings to the use of sarin knew 28% of

doctors , and in the case of the use of ammonia – 37.3% of people [15].

Analysis of the research material showed that only one in five people knew the basic principles, which in the case of chemical contamination can prevent recontamination of both medical personnel, patients in the hospital as well as medical equipment. It is a disturbing fact, since increasing the zone of contamination causing additional illness to others.

The alarming level of knowledge was also demonstrated in the case of testing the knowledge of the indications for the use of antidotes. Low level of knowledge applies especially nursing students, who in comparison with students of medical rescue came off worse in each of the analysed ranges of Conduct chemical contaminations.

Among the students of medical emergency, most people (88%) say the need for and willingness to participate in training both theoretical and simulated on the treatment of chemical contaminations. Concerns however is the fact that despite the low knowledge only every other nursing student sees the need for such training. The need for training of medical staff also indicates other authors including [16,17].

Conclusions

- 1) Students of medicine do not have enough knowledge for dealing with chemical contaminations.
- 2) It is necessary to introduce mandatory training within the study of emergency measures in contaminations.
- 3) High self-knowledge of the proceedings in chemical contaminations among nursing students is disproportionate to their actual knowledge.

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