

Research Paper: Investigating Emergency Nurses' Awareness on the Differentiation Between Acute Methanol and Ethanol Intoxication



Azadeh Memarian¹, Romina Mostofizadeh², Kamran Aghakhani³, Sahar Rismantab Sani⁴, Leyla Abdolkarimi⁵, Siamak Soltani^{3*}

1. Department of Forensic Medicine, Mazandaran University of Medical Science, Sari, Iran.

2. General Medicine, Iran University of Medical Science, Tehran, Iran.

3. Department of Forensic Medicine, Iran University of Medical Science, Tehran, Iran.

4. Department of Internal Medicine, Mazandaran University of Medical Science, Ramsar Campus, Iran.

5. Department of Forensic Medicine, Shahid Ragaee Cardiovascular Medical and Research Center, Tehran, Iran.



Citation: Memarian A, Mostofizadeh R, Aghakhani K, Rismantab Sani S, Abdolkarimi L, Soltani S. Investigating Emergency Nurses' Awareness on the Differentiation Between Acute Methanol and Ethanol Intoxication. International Journal of Medical Toxicology and Forensic Medicine. 2021; 11(3):33532. <https://doi.org/10.32598/ijmtfm.v11i3.33532>

<https://doi.org/10.32598/ijmtfm.v11i3.33532>



ABSTRACT

Background: Alcohol intoxication is among the leading and preventable causes of death, disability, and injury in numerous societies. Ethanol and methanol are the most commonly used types of alcohol. Increasing nurses' awareness about the difference between intoxication with these two alcohol types will prevent the occurrence of dangerous and deadly complications of intoxication. We investigated the awareness of the nurses respecting the difference between acute methanol and ethanol intoxication in clinical manifestations, diagnosis, and treatment.

Methods: A cross-sectional study was performed in 2020 on the emergency nurses from two educational hospitals. A total of 100 nurses participated in this study. The data collection tool was a researcher-made questionnaire, including demographic characteristics and questions concerning the identification and differentiation of acute methanol from ethanol intoxication. Moreover, the obtained data were analyzed using SPSS v. 20 at the significance level of $P < 0.05$.

Results: The present research results suggested that 21% of the examined nurses had a low level of awareness (< 7) and 79% had a moderate level of awareness (8-13). The mean score of awareness was measured as 8.71 (range: 2-12). Nurses' awareness was not related to age, gender, the duration of working experience, and educational level ($P > 0.05$).

Conclusion: The awareness of nurses regarding alcohol poisoning is moderate. Due to the importance of differentiating ethanol from methanol toxicity, considering the outcomes of the patients, nurses' awareness should be increased.

Article info:

Received: 29 Dec 2020

First Revision: 14 Jan 2021

Accepted: 5 Apr 2021

Published: 19 Oct 2021

Keywords:

Alcohol intoxication,
Emergency service, Hospitals,
Methanol, Ethanol

* Corresponding Author:

Siamak Soltani, PhD.

Address: Department of Forensic Medicine, Iran University of Medical Sciences, Tehran, Iran.

Tel: +98 (912) 0704959

E-mail: soltani.s@iums.ac.ir

1. Introduction

Ethanol or fruit alcohol is a chemical substance (C_2H_5OH), i.e., present in alcoholic beverages; however, methanol or wood alcohol is a chemical substance (CH_3OH), as the simplest alcohol [1-4]. Ethanol absorption is highly rapid and the peak of its symptoms appears in the first 1-2 hours in the form of intoxication, flushing, talkativeness, gastrointestinal symptoms, etc., which improve over time. While with methanol, the patient usually encounters the clinical manifestations late; the patient's clinical condition aggravates over time. Methanol poisoning caused by methanol-contaminated ethanol has been reported in various parts of the world. In our country, in recent years, cases of methanol poisoning have been reported [3-26]. Ran et al. [27] stated that coma, the shortness of breath, pH, and Anion Gap (AG) along with calcium, potassium, creatinine, and blood sugar levels were associated with the severity of methanol poisoning. Acute methanol poisoning can lead to nerve damage, metabolic acidosis, and gastrointestinal damage. Most patients recovered after comprehensive, timely, and effective treatment.

Due to the increasing trend of official reports, increasing availability and the consumption of methanol-containing alcoholic beverages, alcohol intoxication has become a public health challenge in Iran [28]. Methanol or wood alcohol intoxication is among the emergencies in which timely diagnosis and treatment play an essential role in reducing death, blindness, and other biopsychological disabilities. In our country, cases of methanol intoxication have been reported [29] due to the consumption of methanol-contaminated alcohol. The most significant case of mass intoxication induced by methanol consumption in the country was observed with the outbreak of the Coronavirus Disease 2019 (COVID-19) in some provinces [28].

A crucial principle in the management and treatment of toxic alcohol intoxication, especially methanol, is a rapid and accurate diagnosis. It is impossible to perform emergency tests to determine the serum level of alcohol in most parts of the country. Since the metabolites of toxic alcohols are primarily responsible for their adverse effects, alcohol levels in the blood may dramatically drop shortly after consumption; all of them may be converted to toxic metabolites. Therefore, while the patient encounters the effects of toxic alcohol intoxication, laboratory tests cannot demonstrate the presence of methanol in the serum. Moreover, incorrect sampling

in which ethyl alcohol is used as a skin disinfectant can lead to false-positive responses. Clinical symptoms and the mortality of patients are significantly more associated with metabolic acidosis and central nervous system weakness than with serum methanol concentrations [22, 30, 31]. A study investigated the epidemiology of alcohol intoxication and its results in the northwest of Iran; the relevant mortality rate was equal to 7.3%, all of which were related to methanol. Accordingly, the mortality rate of intoxication with methanol was estimated to be 20% [32].

Nurses play an important role in the health of individuals in the community and promoting accurate information about diseases, as well as being the first line of treatment for patients and especially in the emergency room. Therefore, having sufficient and correct information about the symptoms, signs, and risk factors as well as irreparable complications and dangers of alcohol poisoning is necessary for them. Public awareness and education should be increased to prevent methanol mortality. Nurses play a key role in improving community health through assessment, prevention, education, and access to emergency care [33, 34]. Given the significance of the educational role of nurses in the hospital, having sufficient awareness, information, and experience in this field seem necessary. Therefore, we evaluated the level of nurses' awareness about high-risk alcohol intoxication.

2. Materials and Methods

The present cross-sectional study was performed in Rasoul Akram (PBUH) and seventh of Tir Hospitals in 2020. The emergency nurses from two hospitals affiliated with the Iran University of Medical Sciences who were selected by census method participated in the study. We considered the sample size based on all the nurses working in the emergency department of Rasoul and seventh of Tir Hospitals. A total of 100 subjects participated in this study. The study participants were requested to complete the questionnaires.

The data collection tool in this study was a researcher-made questionnaire designed based on information about ethanol and methanol poisoning [35]. It consists of two parts. The first part contains demographic information, including age, gender, years of work experience, the type of employment, job position, and history of toxicology training. The second part consists of 20 four-choice test questions; of which, 8 questions were specifically related to acute ethanol poisoning, 8 questions were related to acute methanol poisoning, and 4 questions concerned distinguishing between acute methanol and ethanol poison-

ing. Content Validity Ratio (CVR) and Content Validity Index (CVI) were employed to assess the content validity, using the opinions of 5 experts in the relevant field. CVI and CVR were determined to be 0.87 and 0.92, respectively, i.e., an acceptable value for this questionnaire. Given that the questionnaire was designed as a scientific test, there was no need to check its reliability. Each question was given a score and scores of 0-7 were considered weak, scores of 8-12 were moderate, scores of 13-16 were good, and scores of 17-20 were considered very well. The nurses voluntarily participated in the study. Due to time constraints in work shifts, the researcher applied for collaboration in several different work shifts.

The data were analyzed using Independent Samples t-test, one-way Analysis of Variance (ANOVA), and Pearson/Spearman correlation tests in SPSS v. 20. Furthermore, $P < 0.05$ was considered statistically significant.

3. Results

In this study, 100 nurses were participated and completed the questionnaires. Furthermore, 88% of them were female and 12% were male. Regarding the questions related to ethanol poisoning ($n=8$), 5 subjects marked 1 correct answer, 23 individuals reported 2 correct answers, 26 participants provided 3 correct answers, 28 subjects gave 4 correct answers, 14 individuals reported 5 correct answers, and 4 participants provided 6 correct answers. On average, the study nurses received a score

of 3.5 out of questions related to the knowledge of ethanol poisoning. Regarding the questions concerning acute methanol poisoning ($n=8$), 4 subjects provided 1 correct answer, 21 individuals marked 2 correct answers, 33 participants reported 3 correct answers, 30 individuals marked 4 correct answers, 8 subjects provided 5 correct answers, and 4 participants marked 6 correct answers. On average, nurses received a score of 3.29 on questions related to the knowledge of acute methanol poisoning. Regarding the questions on the knowledge of differentiating acute methanol poisoning from ethanol ($n=4$), 10 study subjects provided an incorrect answer, 11 individuals reported 1 correct answer, 43 nurses marked 2 correct answers, 34 subjects indicated 3 correct answers, and 4 participants reported 4 correct answers. On average, nurses received a score of 2.07 on questions related to the awareness of the distinction between acute methanol and ethanol poisoning (Table 1).

In general, according to the answers of the study subjects, their Mean \pm SD score was 8.71 ± 0.22 . The lowest score was 2 and the highest score was 12. Out of 100 research participants, 21% were evaluated as weak (0-7) and 79% as moderate (8-12). None of the examined nurses were classified in the considered range (16-13), i.e., evaluated to be well. None of the explored nurses were in the addressed range (17-20), i.e., considered as very well (Table 2).

Overall, there was no relationship between factors, such as age, gender, educational level, and years of work

Table 1. Examined nurses' scores on questions related to the knowledge of ethanol and methanol poisoning and their differentiation

Scores of Questions	No.(%)			
	Ethanol	Methanol	Differentiation	
0	-	-	-	10(10)
1	5(5)	4(4)	11(11)	
2	23(23)	21(21)	43(43)	
3	26(26)	33(33)	34(34)	
4	28(28)	30(30)	2(2)	
5	14(14)	8(8)	-	-
6	4(4)	4(4)	-	-
7	-	-	-	-
8	-	-	-	-
Average score	3.5	3.29	2.07	

Table 2. The distribution of nurses' awareness

Level of Awareness	No.(%)
Weak (7-1)	21(21)
Medium (8-12)	79(79)
Good (13-16)	0(0)
Very good (17-20)	0(0)

International Journal of
Medical Toxicology & Forensic Medicine

experience and nurses' scores, and the level of knowledge. Slight differences in scores can be due to individual studies of nurses. Therefore, due to the insignificance of these relations, we do not state them here.

4. Discussion

This study examined the knowledge of emergency nurses in two hospitals about alcohol poisoning. According to the obtained results, most of the examined nurses (89%) presented moderate knowledge. The role and position of nurses in the initial exposure of emergency patients are of great significance. The early diagnosis and treatment of patients with methanol poisoning could majorly prevent irreversible complications and associated death. Thus, more precise studies and planning are required in this respect. Similarly, Rutto et al. [24] examined nurses' knowledge, attitude, and practice in managing the cases of acute alcohol poisoning in adults. They concluded that most (88.2%) nurses stated that further training is needed for the initial management of poisoning. Thus, the knowledge of nursing staff not only in our country but also in other countries has been assessed as insufficient. Therefore, considering the importance of this issue, it is necessary to carefully study the causes of insufficient knowledge and train personnel in this regard.

Aghababaeian et al. [23] reported the high mortality rate of methanol poisoning in Iran. Such outbreaks are mostly due to ignorance and legal restrictions in low-income and Islamic countries; therefore, an effective educational model should be sought to increase public awareness and medical staff's knowledge. Besides a completely indigenous and warning system should be developed in this regard. Such measures could help to reduce injuries and increase preparedness to cope with the effects of these epidemics on the health system. Measures can be taken to increase nurses' awareness with the help of tools, like post-graduation training programs. Considering the necessity of this matter, it seems necessary to carefully study the causes of insufficient knowledge. It is

also critical to train nurses to recognize poisonings and their complications. In an extensive study to determine nurse's knowledge, attitude, and practice on the initial management of acute poisoning, the general knowledge of nurses on poisoning was assessed using 14 items. The item for which nurses displayed the lowest knowledge level was the relationship between gender and the ingestion of poison in the general population. Only 51.5% of the nurses were aware that women were more prone to take poison than men. Another question, i.e., poorly scored was the alimentary signs and symptoms of acute poisoning during early stages; most nurses could not differentiate signs affecting the gastrointestinal system and those affecting other body systems [24]. Turnbull and Chalder [36] indicated that after the implementation of a training package on poisoning, the general knowledge of staff improved while attitudes remained unfavorable.

In this study, there was no relationship between age, gender, educational level, and years of working experience, and nurses' scores and level of knowledge. Minor differences in scores can be due to individual studies on nurses. Therefore, due to the lack of relationship between the above-mentioned factors and the level of nurses' knowledge, the role of training can be more important than the factors, such as education, age, gender, and work experience. It significantly increases staff awareness and must be included in the medical staff programs. McCarthy and Gijbels's [37] reported no correlation between total scores and gender or a history of self-harm education; although older nurses and hospital trained nurses had less positive attitudes. Previous studies [38, 39] reported that older and more experienced nurses had more supportive attitudes than their younger and less experienced counterparts. They further reported that nurses who had attended in-service education on deliberate poisoning adopted more positive attitudes than non-attendees.

5. Conclusion

The awareness of nurses regarding alcohol poisoning was found to be moderate. Due to the importance of differentiating ethanol from methanol toxicity, concerning the outcomes of the patients, nurses' awareness should be improved. Considering the serious risks and complications of alcohol poisoning, it is necessary to take appropriate measures by implementing further studies and proper planning to increase the knowledge and awareness of nurses.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles are considered in this article. The participants were informed of the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information and were free to leave the study whenever they wished, and if desired, the research results would be available to them. A written consent has been obtained from the subjects. This study was approved by the Ethics Committee of the Iran University of Medical Sciences (Ethical Code: IR.IUMS.FMD.REC.1399.404).

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.

Author's contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflicts of interest.

Acknowledgments

We would like to thank all of participants in this study as well as staff of Rasoul Akram (PBUH) and Haft-e-Tir Hospitals who helped us to conduct this research.

References

- [1] Favre HA, Powell WH. Nomenclature of organic chemistry: IUPAC recommendations and preferred names 2013. London: Royal Society of Chemistry; 2013. [https://books.google.com/books?id=4USgAgAAQBAJ&printsec=](https://books.google.com/books?id=4USgAgAAQBAJ&printsec=cover&dq=)
- [2] Ballinger P, Long FA. Acid Ionization Constants of Alcohols. II. Acidities of Some Substituted Methanols and Related Compounds^{1,2}. *J Am Chem Soc.* 1960; 82(4):795-8. [DOI:10.1021/ja01489a008]
- [3] Afzal A, Fatima S, Ahmed AM. Methanol poisoning. *TPMJ.* 2017; 24(03):490-4. [DOI:10.17957/TPMJ/17.3751]
- [4] Zahavi D, Grünbaum T, Parnas J, editors. The structure and development of self-consciousness: interdisciplinary perspectives. Amsterdam: John Benjamins Publishing; 2004. <https://books.google.com/books?id=s38ZlZxth5gC&printsec=frontcover&dq=>
- [5] Ghazi-Khansari M, Oreizi S. A prospective study of fatal outcomes of poisoning in Tehran. *Vet Hum Toxicol.* 1995; 37(5):449-52. [PMID]
- [6] Abdollahi M, Jalali N, Sabzevari O, Hoseini R, Ghanea T. A retrospective study of poisoning in Tehran. *J Toxicol Clin Toxicol.* 1997; 35(4):387-93. [DOI.org/10.3109/15563659709043371]
- [7] Jalali N, Pajumand AK, Abdollahi M, Shadnia Sh. Mortality status due to acute chemical and drug poisoning in Tehran (1997-1998) (Persian)]. *J Babol Univ Med Scis.* 2001; 3(1):34-41. <http://jbums.org/article-1-2883-fa.html>
- [8] Khairabadi GR. [Intentional and accidental poisoning and its relationship with some individual characteristics of the poisoned (Persian)]. *J Kurdistan Univ Med Sci.* 2001; 6(1):26-30. <https://www.sid.ir/fa/journal/ViewPaper.aspx?id=12574>
- [9] Aqabigloui A, Pajoumand AK, TofiqiZavareh H. Determining the frequency of chemicals and drugs in cases of suicide attempt leading to hospitalization in the poisoned ward of Loghman Hospital in Tehran, winter 2000 (Persian)]. *Iran J Forensic Med.* 2002; 8(28):10-3. <https://www.sid.ir/fa/journal/ViewPaper.aspx?ID=13629>
- [10] Moghadamnia AA, Abdollahi M. An epidemiological study of poisoning in northern Islamic Republic of Iran. *East Mediterr Health J E Mediterr Health J.* 2002; 8(1):88-94. <https://apps.who.int/iris/handle/10665/119141>
- [11] Izadi Mod N, Gheshlaghi F, Sharafi SE, Investigation of poisonings leading to death in the poisoned ward of Isfahan Noor Medical Center (Persian)]. *Iran J Forensic Med.* 2003; 9(31):122-6. <https://www.sid.ir/fa/journal/ViewPaper.aspx?ID=12034>.
- [12] Najari F, Afshar M. A report of fatal poisonings that were referred to forensic medicine in 2001 (Persian)]. *Razi J Med Sci.* 2004; 11(40):309-18. <https://www.sid.ir/fa/journal/ViewPaper.aspx?id=11189>.
- [13] Afzali S, Rashidi P, One-year study of the causes of mortality due to drug and chemical poisoning in Sina Hospital in Hamadan (Persian)]. *Avicenna J Clin Med.* 2003; 10(3):62-6. <http://sjh.umsha.ac.ir/article-1-661-fa.html>.
- [14] Bushehri B, Yekta Z, ZareiKhairabad A, Kabiri SH, Kazempour A. Frequency of chemical and drug use in poisoned patients admitted to Taleghani Hospital in Urmia in 2001-2003 (Persian)]. *Iran J Forensic Med.* 2004; 10(35):126-31. <https://www.sid.ir/fa/JOURNAL/ViewPaper.aspx?id=32373>.
- [15] Afshari R, Majdzadeh R, Balai-Mood M. Pattern of acute poisonings in Mashhad, Iran 1993-2000. *J Toxicol Clin Toxicol.* 2004; 42(7):965-75. [DOI:10.1081/CLT-200042550]

- [16] Eizadi-Mood N, Yaraghi A, Gheshlaghi F, Mogiri R. [Poison-induced seizures in 66 patients: Causes, treatments and outcomes (Persian)]. *Tehran Univ Med J*. 2008; 66 (3) :214-220. <http://tumj.tums.ac.ir/article-1-627-en.html>
- [17] Shadnia S, Esmaily H, Sasanian G, Pajoumand A, Hassanian-Moghaddam H, Abdollahi M. Pattern of acute poisoning in Tehran-Iran in 2003. *HET*. 2007; 26(9):753-6. [DOI:10.1177/0960327107083017]
- [18] Hassanian-Moghaddam H, Pajoumand A, Dadgar SM, Shadnia SH. Prognostic factors in methanol poisoning. *HET*. 2007; 26(7):583-6. [DOI:10.1177/0960327106080077]
- [19] Hassanian-Moghaddam H, Pajoumand A, Sarjami S. [One year epidemiological study of acute adult and adolescent poisoning admitted to Loghman Hospital, Tehran (Persian)]. 2004-2005. *J Forensic Med*. 2008; 13(4):235-40. <http://sjfm.ir/article-1-4-en.html>
- [20] Hassanian Moghaddam H, Pajoumand A. [A one-year epidemiological study of acute poisoning among adults and adolescents admitted to Loghman hospital, Tehran between 2005 and 2006 (Persian)]. *Pajoothane*. 2007; 12(3):169-76. <http://pajoothane.sbmu.ac.ir/article-1-601-fa.html>
- [21] Karami M, Ebrahimzadeh MA, Yousefi P, Khani K. [Investigation of causes and factors of drug poisoning in Buali and Nime Shaban hospitals in Sari in 2000-2002 (Persian)]. *Razi J MedSci*. 2004; 11(42):629-36. <https://www.sid.ir/fa/Journal/ViewPaper.aspx?id=11211>
- [22] Barceloux DG, Randall Bond G, Krenzelok EP, Cooper H, Allister Vale J. American Academy of Clinical Toxicology practice guidelines on the treatment of methanol poisoning. *J Toxicol Clin Toxicol*. 2002; 40(4):415-46. [DOI:10.1081/CLT-120006745]
- [23] Aghababaeian H, AraghiAhvazi L, Ostadtaghizadeh A. The methanol poisoning outbreaks in Iran 2018. *Alcohol Alcohol*. 2019; 54(2):128-30. [DOI:10.1093/alcalc/azg005]
- [24] Rutto J, Chepchirchir A, Odera T. Nurse's knowledge, attitude and practice on the initial management of acute poisoning among adult casualties: Study at Kenyatta National Hospital, Kenya [MSc. Thesis]. Kenya: University Of Nairobi; 2011. <http://erepository.uonbi.ac.ke/handle/11295/10654>
- [25] Gallagher N, Edwards FJ. The diagnosis and management of toxic alcohol poisoning in the emergency department: a review article. *Adv J Emerg Med*. 2019; 3(3):e28. [DOI:10.22114/ajem.v0i0.153] [PMCID] [PMID]
- [26] Wang C, Samaha D, Hiremath S, Sikora L, Sood MM, Kanji S, et al. Outcomes after toxic alcohol poisoning: A systematic review protocol. *Syst Rev*. 2018; 7(1):1-7. [DOI:10.1186/s13643-018-0926-z]
- [27] Ran M, Li Y, Zhang L, Wu W, Lin J, Liu Q, Ou S. Clinical features, treatment, and prognosis of acute methanol poisoning: experiences in an outbreak. *Int J Clin Exp Med*. 2019; 12(5):5938-50. <http://www.ijcem.com/files/ijcem0085245.pdf>
- [28] Shokoohi M, Rahimi-Movaghgar A, Noroozi A, Karamouzian M. A public health approach to alcohol use and its related harms in Iran. *Lancet Public Health*. 2019; 4(4):e175-6. [DOI:10.1016/S2468-2667(19)30038-6]
- [29] Hassanian-Moghaddam H, Nikfarjam A, Mirafzal A, Saberinia A, Nasehi AA, MasoumiAsl H, Memaryan N. Methanol mass poisoning in Iran: Role of case finding in outbreak management. *J Public Health*. 2015; 37(2):354-9. [DOI:10.1093/pubmed/fdu038]
- [30] Kurtaş Ö, Imre KY, Özer E, Can M, Birincioglu İ, Bütün C, Kırıcı GS, Yıldırım A, Kıyak S, Yılmaz R. The evaluation of deaths due to methyl alcohol intoxication. *Biomed Res India*. 2017; 28(8):3680-7. <https://hdl.handle.net/20.500.12462/6697>
- [31] Holt NR, Nickson CP. Severe methanol poisoning with neurological sequelae: implications for diagnosis and management. *Intern Med J*. 2018; 48(3):335-9. [DOI:10.1111/imj.13725]
- [32] Morteza Bagi HR, Tagizadieh M, Moharamzadeh P, Pourghaei M, Kahvareh Barhagi A, Shahsavari Nia K. Epidemiology of alcohol poisoning and its outcome in the north-west of Iran. *Emergency (Tehran, Iran)*. 2015; 3(1):27-32. [https://www.safelylit.org/citations/index.php?fuseaction=citations.view_details&citationIds\[\]=citjournalarticle_501424_1](https://www.safelylit.org/citations/index.php?fuseaction=citations.view_details&citationIds[]=citjournalarticle_501424_1)
- [33] Wegener J, Fong D, Rocha C. Education, practical training and professional development for public health practitioners: a scoping review of the literature and insights for sustainable food system capacity-building. *Public Health Nutrition*. 2018; 21(9):1771-80. [DOI:10.1017/S1368980017004207]
- [34] Smith RD. *Veterinary clinical epidemiology: From patient to population*. Boca Raton, Florida: CRC Press; 2019. <https://books.google.com/books?id=pDCmxAEACAAJ&dq=Veterinary+clinical+epidemiology:+From+patient+to+population&hl=>
- [35] Nelson LS, Hoffman RS, Howland MA, Lewin NA, Goldfrank LR. *Goldfrank's toxicologic emergencies*. 11th ed. New York: McGraw Hill Professional; 2018. https://www.google.com/books/edition/Goldfrank_s_Toxicologic_Emergencies_Elev/a6QwswEACAAJ?hl=en
- [36] Turnbull G, Chalder T. Effects of education on attitudes to deliberate self-harm. *Psychiatric Bulletin*. 1997; 21(6):334-5. <https://www.cambridge.org/core/journals/psychiatric-bulletin/article/effects-of-education-on-attitudes-to-deliberate-selfharm/9F1B67871F5BCD6CA8B1D23F5126199C>
- [37] McCarthy L, Gijbels H. An examination of emergency department nurses' attitudes towards deliberate self-harm in an Irish teaching hospital. *Int Emerg Nurs*. 2010; 18(1):29-35. [DOI:10.1016/j.ienj.2009.05.005]
- [38] McCann T, Clark E, McConnachie S, Harvey I. Accident and emergency nurses' attitudes towards patients who self-harm. *Accid Emerg Nurs*. 2006; 14(1):4-10. [DOI:10.1016/j.aeen.2005.10.005]
- [39] Mc Laughlin C. Casualty nurses' attitudes to attempted suicide. *J Adv Nurs*. 1994; 20(6):1111-8. [DOI:10.1046/j.1365-2648.1994.20061111.x]