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Original Article

Educational Session on Acute Poisoning Management Among Emergency Nurses: A Quasi-Experimental Study.

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ABSTRACT

Background: Acute poisoning is a major emergency care burden in low- and middle-income countries, and frontline nurses frequently manage the earliest and most time-sensitive phases of assessment and stabilization; however, evidence indicates substantial competency gaps that may compromise early care quality (1–5). Objective: To evaluate the effectiveness of a structured educational session in improving nurses' knowledge and self-reported practices regarding acute poisoning management in tertiary-care emergency departments in Peshawar, Pakistan. Methods: A quasi-experimental pre–post intervention study was conducted among 125 registered nurses working in accident and emergency departments of three public tertiary care hospitals. Outcomes were measured using a validated questionnaire assessing poisoning-related knowledge (15 items) and practice (35 items) (2). Participants completed baseline assessment, attended a one-hour educational session (lecture plus practical demonstration), and completed post-intervention assessment one week later. Paired-sample t-tests compared pre- and post-intervention scores with statistical significance set at $p<0.05$. Results: Knowledge increased from 7.08±0.78 to 14.47±0.75 (mean difference 7.39, 95% CI 7.19–7.59, $p<0.001$), and practice increased from 12.81±3.19 to 33.63±1.56 (mean difference 20.82, 95% CI 20.16–21.48, $p<0.001$). Conclusion: A brief structured educational session produced large, precise improvements in nurses' poisoning management knowledge and reported practices, supporting protocol-focused training as a practical continuing professional development strategy in emergency settings. Keywords: Acute poisoning; Emergency nursing; Educational intervention; Knowledge; Practice; Quasi-experimental study.

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INTRODUCTION

Acute poisoning represents a major global public health challenge, contributing substantially to emergency department admissions, intensive care utilization, and preventable mortality. Worldwide, an estimated three million cases of poisoning occur annually, resulting in nearly 250,000 deaths, with approximately 99% of these fatalities occurring in low- and middle-income countries where surveillance systems, emergency infrastructure, and toxicology training are often limited (1). Acute poisoning may result from accidental exposure, occupational hazards, deliberate self-harm, or misuse of pharmaceuticals and chemicals, and its management requires rapid recognition, prompt stabilization, and timely implementation of evidence-based interventions. Nurses working in accident and emergency departments constitute the frontline responders in such situations, frequently performing the initial assessment, triage, airway stabilization, monitoring of vital parameters, and coordination of immediate clinical care (2). Consequently, the quality of early poisoning management is highly dependent on the knowledge, clinical judgment, and procedural competence of nursing staff.

Despite the critical role nurses play in the early management of poisoning, previous studies consistently report deficiencies in knowledge and clinical preparedness among emergency nursing personnel. Investigations conducted in multiple healthcare settings have demonstrated that many nurses lack adequate understanding of toxicological principles, early symptom recognition, antidote administration, and gastrointestinal decontamination procedures (3). These deficiencies may delay treatment initiation,

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increase complications, and adversely influence patient outcomes. Evidence from several international studies further highlights substantial gaps in both theoretical knowledge and clinical performance related to acute poisoning management. For example, studies conducted in Egypt and Ethiopia reported that more than three-quarters of nurses working in emergency units demonstrated poor knowledge regarding poisoning assessment and treatment protocols (6,7). Similar findings were reported in Kenya, where nurses lacked essential competencies required for recognizing toxicological emergencies and initiating appropriate management (8). Collectively, these findings underscore the widespread nature of this knowledge gap and emphasize the need for structured educational interventions aimed at improving emergency nursing competence.

The burden of poisoning in Pakistan further magnifies the importance of strengthening clinical preparedness among healthcare providers. National epidemiological data remain limited due to fragmented reporting systems and underdeveloped poison control infrastructure; however, available hospital-based evidence indicates that poisoning represents a significant contributor to emergency morbidity. A tertiary-care hospital study conducted in Karachi reported that approximately 40% of intensive care unit admissions were related to poisoning, with organophosphate compounds being the most common agents and a mortality rate of 5.6% (4). In addition, findings from the National Health Survey of Pakistan identified poisoning as the second most frequent cause of unintentional injury among individuals aged five years and above (5). Long-term institutional reviews have similarly documented persistent trends in poisoning cases across Pakistani hospitals over the past two decades, indicating a sustained clinical burden on emergency services (21). The increasing availability of pesticides, pharmaceuticals, and industrial chemicals in both urban and rural environments further increases the risk of toxic exposures, particularly in developing healthcare systems where emergency toxicology expertise remains limited.

Educational interventions have been proposed as an effective strategy for improving clinical competency among healthcare professionals managing poisoning cases. Previous studies have demonstrated that targeted training programs, workshops, and instructional modules can significantly improve nurses' knowledge, attitudes, and clinical practices related to pharmacovigilance and toxicological emergencies (10,11,15). For example, structured nursing education programs have shown measurable improvements in the ability of nurses to recognize poisoning symptoms, implement stabilization protocols, and perform gastrointestinal decontamination procedures (10). Training initiatives have also been associated with improved clinical decision-making, adherence to emergency protocols, and enhanced patient safety outcomes (12). However, most available studies originate from regions outside Pakistan, and the evidence regarding the effectiveness of structured educational interventions within the Pakistani healthcare context remains scarce.

Furthermore, existing nursing curricula in many institutions provide limited emphasis on toxicological emergencies, resulting in insufficient exposure to poisoning management during formal training. As clinical toxicology continues to evolve alongside increasing pharmaceutical and chemical exposures, healthcare systems require ongoing professional development programs to ensure that frontline providers maintain adequate competencies in emergency care. Evaluating the effectiveness of structured educational sessions within real clinical environments can therefore provide valuable evidence to guide policy development, nursing education strategies, and hospital training programs.

Given the significant burden of poisoning cases in emergency departments and the documented knowledge gaps among nursing staff, there is a clear need to assess whether targeted educational interventions can improve nurses' preparedness to manage toxicological emergencies effectively. Therefore, the present study aimed to evaluate the effectiveness of a structured educational session in improving the knowledge and self-reported clinical practices of nurses working in accident and emergency departments of tertiary care hospitals in Peshawar, Pakistan. The study sought to determine

whether participation in a short, focused educational intervention would lead to statistically significant improvements in nurses' knowledge and clinical practice scores related to acute poisoning management.

MATERIALS AND METHODS

This study employed a quasi-experimental pre- and post-intervention design to evaluate the effectiveness of a structured educational session in improving nurses' knowledge and self-reported clinical practices related to acute poisoning management. The study was conducted in the accident and emergency departments of three major public tertiary care hospitals in Peshawar, Pakistan, namely Lady Reading Hospital, Khyber Teaching Hospital, and Hayatabad Medical Complex. These hospitals function as major referral centers for the province and receive a large number of emergency cases, including toxicological emergencies. Data collection was carried out over a defined study period during which nurses working in these emergency departments were approached for participation.

The study population consisted of registered nurses actively working in the accident and emergency departments of the selected hospitals during morning, evening, or night shifts. Nurses were considered eligible if they were formally registered with the nursing regulatory authority and were currently assigned to the emergency unit at the time of the study. Nurses who were on extended leave during the data collection period or those who declined participation were excluded. The sampling frame included all eligible nurses working in the emergency departments of the three participating hospitals. Participants were recruited through proportionate random sampling to ensure representation from each hospital based on the number of eligible nurses available at the respective institutions.

The final study sample consisted of 125 nurses who completed both the pre-intervention and post-intervention assessments. Prior to enrollment, each participant received a detailed explanation of the study objectives, procedures, and voluntary nature of participation. Written informed consent was obtained from all participants. Participation was entirely voluntary, and participants were assured that their responses would remain confidential and would not influence their employment status or professional evaluations.

Data were collected using a validated self-administered questionnaire that had previously been used in similar studies evaluating nurses' knowledge and practices regarding acute poisoning management (2). The instrument demonstrated acceptable internal consistency with a reported Cronbach's alpha coefficient of 0.75. The questionnaire consisted of three sections. The first section collected demographic information including gender, professional qualification, hospital affiliation, years of accident and emergency department experience, and previous training related to poisoning management. The second section assessed knowledge related to acute poisoning management and consisted of 15 multiple-choice items covering recognition of poisoning symptoms, emergency stabilization, antidote use, and general toxicology principles. The third section evaluated clinical practices using a structured checklist comprising 35 items related to airway, breathing, and circulation assessment, history taking, physical examination, gastrointestinal decontamination procedures, and emergency interventions.

Responses for knowledge and practice items were scored using a binary scoring method, where correct responses were assigned a score of one and incorrect responses were assigned a score of zero. Total scores were calculated by summing the correct responses for each participant. Higher scores indicated better knowledge and more appropriate clinical practices related to poisoning management.

Data collection was conducted in three sequential phases consisting of pre-intervention assessment, educational intervention, and post-intervention evaluation. During the initial phase, baseline data were collected using the questionnaire under the supervision of the research team to ensure completeness and accuracy of responses. Following the baseline assessment, participants attended a structured educational session designed to improve knowledge and clinical practices related to acute poisoning management. The educational intervention consisted of a one-hour training session including a forty-

five minute lecture delivered using a multimedia presentation and a fifteen-minute practical demonstration focusing on gastrointestinal decontamination techniques and emergency stabilization procedures. The training content covered recognition of poisoning symptoms, initial patient stabilization using airway-breathing-circulation principles, identification of common poisoning agents, and appropriate emergency management protocols.

To evaluate the impact of the educational intervention, the same questionnaire was administered again one week after the training session to measure changes in knowledge and practice scores. The one-week interval was selected to allow participants sufficient time to assimilate the information provided during the educational session while minimizing recall bias.

Several steps were implemented to minimize potential sources of bias. Standardized instructions were provided to all participants during both assessments to ensure uniformity in data collection. The questionnaire was administered in a controlled setting under researcher supervision to reduce the likelihood of discussion among participants during completion. Random sampling was used to enhance representativeness of the study population, and the use of the same validated instrument during both assessments ensured consistency in outcome measurement.

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics including frequencies, percentages, means, and standard deviations were used to summarize demographic characteristics and outcome variables. Paired-sample t-tests were applied to compare mean knowledge and practice scores before and after the educational intervention. Independent sample t-tests were used to examine differences in scores across binary demographic variables such as gender and prior training. One-way analysis of variance was used to evaluate differences across categorical variables with more than two groups, including professional qualification and hospital affiliation. Pearson correlation analysis was performed to assess relationships between continuous variables such as years of emergency department experience and outcome scores. Statistical significance was determined using a two-tailed p-value of less than 0.05.

The study was conducted in accordance with internationally accepted ethical principles for biomedical research involving human participants. Ethical approval was obtained from the Ethical Review Board of Khyber Medical University, Peshawar. Institutional permission for conducting the study was also obtained from the administrative authorities of the participating hospitals. All participants provided written informed consent prior to participation, and confidentiality was ensured by anonymizing questionnaire responses and securely storing all study data accessible only to the research team.

RESULTS

A total of 125 nurses completed both pre-intervention and post-intervention assessments with no missing responses. Participants were predominantly female (82.4%) and most were affiliated with Lady Reading Hospital (65.6%). Regarding education, 41.6% held a Post-RN qualification, and only 13.6% reported prior training in poisoning management (Table 1).

Following the structured educational session, both primary outcomes demonstrated large improvements. The mean knowledge score increased from 7.08 ± 0.78 to 14.47 ± 0.75, yielding a mean difference (MD) of 7.39 points with 95% CI 7.19–7.59 and a very large standardized paired effect (Cohen's $dz = 6.67$), $p < 0.001$ (Table 2). The mean practice score increased from 12.81 ± 3.19 to 33.63 ± 1.56, yielding MD 20.82 points with 95% CI 20.16–21.48 and Cohen's $dz = 5.57$, $p < 0.001$ (Table 2). In absolute terms, knowledge improved from approximately 47.2% of the maximum (15) to 96.5%, while practice improved from 36.6% of the maximum (35) to 96.1%, indicating near-ceiling post-intervention performance.

At baseline, there were no statistically significant associations between demographic variables and pre-intervention knowledge or practice scores (Tables 3–4). Specifically, pre-intervention knowledge did not differ by gender ($t = 1.47$, $p = 0.14$), qualification ($F = 0.41$, $p = 0.66$), hospital affiliation ($F = 1.63$, $p = 0.20$),

years of A&E experience (r = 0.13, p = 0.17), or prior training (t = −1.21, p = 0.23) (Table 3). Similarly, baseline practice scores were not significantly associated with gender (t = 1.05, p = 0.29), qualification (F = 1.11, p = 0.33), hospital (F = 0.56, p = 0.57), years of A&E experience (r = −0.07, p = 0.42), or prior training (t = −1.73, p = 0.09) (Table 4).

Table 1. Demographic characteristics of study participants (N = 125)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	22	17.6
	Female	103	82.4
Educational Qualification	3-Year Diploma	45	36.0
	Post-RN	52	41.6
	4-Year BSN	28	22.4
Hospital Affiliation	Lady Reading (LRH)	82	65.6
	Khyber Teaching (KTH)	24	19.2
	Hayatabad Medical (HMC)	19	15.2
Prior Training in Poisoning Management	Yes	17	13.6
	No	108	86.4

Table 2. Pre–post comparison of knowledge and practice scores (N = 125)

Outcome	Pre-test Mean ± SD	Post-test Mean ± SD	Mean Difference (Post–Pre)	95% CI of Difference	t (df=124)	Effect size (Cohen's dz)	p-value
Knowledge score (0–15)	7.08 ± 0.78	14.47 ± 0.75	7.39	7.19 to 7.59	74.62	6.67	< 0.001
Practice score (0–35)	12.81 ± 3.19	33.63 ± 1.56	20.82	20.16 to 21.48	62.31	5.57	< 0.001

Notes: Mean-difference CIs were derived from the paired t-statistics and sample size (N=125). Direction is expressed as post–pre for interpretability.

Table 3. Association between demographic variables and pre-intervention knowledge scores (N = 125)

Demographic Variable	Test	Statistic	p-value
Gender	Independent t-test	t = 1.47	0.14
Qualification	One-way ANOVA	F = 0.41	0.66
Hospital	One-way ANOVA	F = 1.63	0.20
A&E Experience (years)	Pearson correlation	r = 0.13	0.17
Prior Training	Independent t-test	t = −1.21	0.23

Table 4. Association between demographic variables and pre-intervention practice scores (N = 125)

Demographic Variable	Test	Statistic	p-value
Gender	Independent t-test	t = 1.05	0.29
Qualification	One-way ANOVA	F = 1.11	0.33
Hospital	One-way ANOVA	F = 0.56	0.57
A&E Experience (years)	Pearson correlation	r = −0.07	0.42
Prior Training	Independent t-test	t = −1.73	0.09

The dumbbell estimation plot demonstrates large absolute gains from pre- to post-intervention in both outcomes, with knowledge increasing from 7.08 to 14.47 (Δ = 7.39, 95% CI 7.19–7.59) and practice increasing from 12.81 to 33.63 (Δ = 20.82, 95% CI 20.16–21.48).

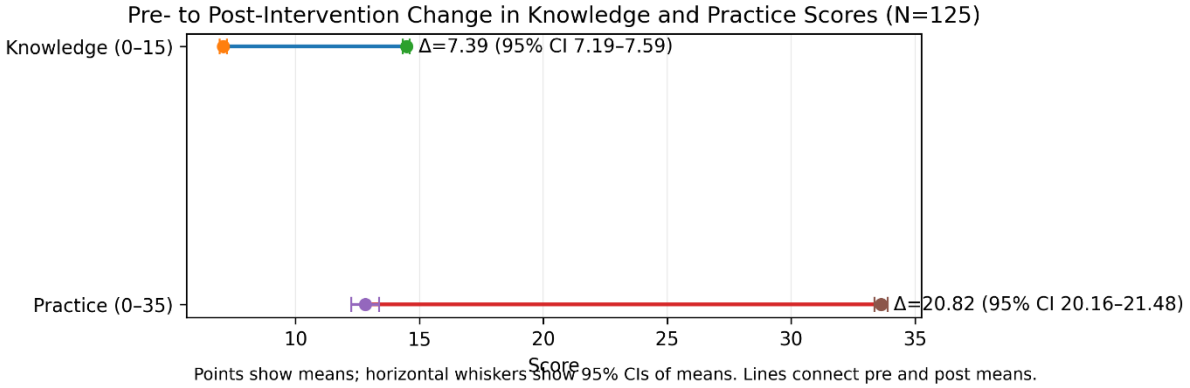

Figure 1: Pre- to Post-Intervention Change in Knowledge and Practice Scores (N=125)

The narrow confidence intervals around the paired mean differences indicate high precision of the estimated improvements, and the post-intervention means approach the upper bounds of each scale (knowledge ≈ 96.5% of

15; practice ≈ 96.1% of 35), suggesting near-ceiling performance after training, consistent with a strong educational effect.

DISCUSSION

This quasi-experimental study demonstrated that a brief, structured educational session produced very large improvements in nurses' knowledge and self-reported practices for acute poisoning management in tertiary-care emergency departments in Peshawar. The magnitude of change was clinically meaningful, with post-intervention scores approaching the upper limits of both scales, indicating that focused, protocol-oriented training can rapidly strengthen frontline preparedness for toxicological emergencies. These findings align with prior evidence showing that emergency-focused educational programs improve nurses' competencies for poisoning and toxicological emergencies, particularly when training integrates stabilization principles, early recognition, and hands-on demonstration of key procedures such as gastrointestinal decontamination (8,12,13). The observed improvement is also consistent with literature from low-resource and high-burden settings where baseline knowledge deficits among emergency nurses are common and responsive to structured training interventions (4,5).

The improvement in knowledge is likely attributable to the concentrated delivery of core toxicology concepts and early management priorities that are essential for time-sensitive poisoning care. Nurses are often responsible for early triage, monitoring, and execution of immediate supportive measures; therefore, strengthening their ability to identify toxidromes, prioritize airway–breathing–circulation stabilization, and initiate appropriate decontamination procedures can plausibly shorten delays to definitive management. Similar training-driven gains have been reported in settings where baseline preparedness was limited by gaps in formal curricula and limited access to continuing professional development, suggesting that the intervention in this study addressed a modifiable systems-level deficiency in emergency nursing readiness (11,14,15). Notably, the post-intervention near-ceiling performance may reflect successful standardization of key steps and improved recall of algorithms, which is particularly relevant in acute poisoning where structured protocols often guide initial decision-making and escalation.

Baseline analyses showed no statistically significant associations between demographic factors (gender, qualification, hospital affiliation, prior training, or A&E experience) and pre-intervention knowledge or practice, suggesting that the initial competency gap was broadly distributed across staff rather than confined to specific subgroups. This finding supports the implementation of unit-wide educational strategies rather than targeting only selected cadres, particularly in high-turnover emergency departments where standardized onboarding and periodic refresher training may be necessary to maintain preparedness. The absence of significant baseline associations also suggests that workplace exposure alone may not reliably translate into competency for poisoning management without structured learning opportunities and explicit protocol reinforcement, which has been highlighted in toxicology training literature (11,16).

Several limitations should be considered when interpreting these results. The quasi-experimental design without a control group limits causal attribution, and improvements may partially reflect testing effects or heightened awareness from repeated measurement. Practice outcomes were self-reported rather than directly observed, which introduces potential social desirability bias and may overestimate true bedside performance. The one-week follow-up interval captured short-term learning gains but does not establish longer-term retention; given the critical nature of poisoning emergencies, future studies should incorporate longer follow-up periods, refresher sessions, and objective competency assessments (e.g., simulation-based evaluation or direct observation checklists) to determine sustained clinical impact. Additionally, the near-ceiling post-intervention scores indicate potential ceiling effects, which may reduce sensitivity for detecting incremental improvements over time and should be addressed in future instrument design through more discriminative items or scenario-based assessments. Despite these limitations, the large effect sizes and narrow confidence intervals suggest a robust short-term educational effect that is likely meaningful for emergency readiness.

Overall, the findings support integrating structured toxicology-focused training into continuing professional development for emergency nurses in tertiary care settings, with emphasis on protocol-based stabilization, recognition of common poisoning presentations, and practical demonstrations of key interventions. Strengthening these competencies may contribute to improved early management, safer escalation, and potentially better patient outcomes in high-burden environments where toxic exposures remain common and healthcare resources are constrained (7,14,15).

CONCLUSION

A structured one-hour educational session significantly improved nurses' knowledge and self-reported clinical practices regarding acute poisoning management in tertiary-care emergency departments in Peshawar, with large, precise pre–post gains and post-intervention performance approaching maximum scale scores, supporting the implementation of protocol-focused toxicology training as a practical continuing professional development strategy for frontline emergency nursing staff (8,12,13).

REFERENCES

1. Singh S, Singh B, Verma LK, Chauhan A. A study of socio-demographic profile and outcome of poisoning cases reported at tertiary care teaching hospital of Northern India. Indian J Forensic Med Toxicol. 2014;14(1):1216.
2. Abebe AM, Kassaw MW, Shewangashaw NE. Assessment of knowledge and practice of nurses on initial management of acute poisoning in Dessie Referral Hospital, Amhara Region, Ethiopia, 2018. BMC Nurs. 2019;18(1):1–8.
3. Poplas-Susic T, Klemenc-Ketis Z, Komericki-Grzinic M, Kersnik J. Glasgow Coma Scale in acute poisonings before and after use of antidote in patients with history of use of psychotropic agents. Srp Arh Celok Lek. 2010;138(3–4):210–3.
4. Sayed YE, Youssef W, Alshekhepy HA, Elfeky H. Nurses' knowledge and practices regarding detection and management of acute drug poisoning at Cairo University Hospitals. Egypt J Nurs. 2015;10(1).
5. Rutto J, Chepchirchir A, Odero T. Nurse's knowledge, attitude and practice on the initial management of acute poisoning among adult casualties: study at Kenyatta National Hospital, Kenya. 2012.
6. Khan NU, Khan UR, Feroze A, Khan SA, Ali N, Ejaz K, et al. Trends of acute poisoning: 22 years experience from a tertiary care hospital in Karachi, Pakistan. J Pak Med Assoc. 2016;66(10):1237.
7. Fatmi Z, Hadden WC, Razzak JA, Qureshi HI, Hyder AA, Pappas G. Incidence, patterns and severity of reported unintentional injuries in Pakistan for persons five years and older: results of the National Health Survey of Pakistan 1990–94. BMC Public Health. 2007;7(1):1–7.
8. Saad Hassan SS, Abo El-Ata AB, Abdu El-Kader HM. Critical care nurses' knowledge and practices about toxicological emergencies. Port Said Sci J Nurs. 2021;8(3):68–83.
9. Freeda I, Bobby S, Solomon-Calvin S, Vinitha S. Effectiveness of self-instructional module on knowledge regarding management of selected poisoning in children among pediatric staff nurses. Manipal J Nurs Health Sci. 2019;5(2):42–8.
10. Zaveri J, Chaudhari A. Impact of educational training and workshop on knowledge, attitude, and practice of pharmacovigilance in nursing staff of tertiary care hospital, Rajasthan. Natl J Physiol Pharm Pharmacol. 2019;9(6):530–3.
11. Lekei E, Ngowi AV, Mkalanga H, London L. Knowledge and practices relating to acute pesticide poisoning among health care providers in selected regions of Tanzania. Environ Health Insights. 2017;11:1178630217691268.
12. Mohammed SM, Abdelaziz Ismail AL, Nagy AA, Al-Metyazidy HA, Allam ZA. Effect of emergent nursing educational program on nurses' performance for patients with acute poisoning. Tanta Sci Nurs J. 2021;21(2):224–50.
13. Hussien AA, Emery SE, Labeeb SA, Marzouk SA. Nurses' knowledge and performance regarding care for children with poisoning at emergency unit. Assiut Sci Nurs J. 2014;2(3):115–22.
14. Tefera GM, Teferi LG. Prevalence, predictors and treatment outcome of acute poisoning in Western Ethiopia. Open Access Emerg Med. 2020;12:365.
15. Mbarouk GS, Sawe HR, Mfinanga JA, Stein J, Levin S, Mwafongo V, et al. Patients with acute poisoning presenting to an urban emergency department of a tertiary hospital in Tanzania. BMC Res Notes. 2017;10(1):1–7.
16. Alinejad S, Zamani N, Abdollahi M, Mehrpour O. A narrative review of acute adult poisoning in Iran. Iran J Med Sci. 2017;42(4):327.