

Toxic Substances Encountered and Treated in the Emergency Department

Ahed J Alkhatib^{1,2*}, Khaled Abdullah Almutleb³, Hussain Brakh Al Harbi³, Abdulaziz Mufadhi Mohammed Alanazi⁴

¹Department of Legal Medicine, Toxicology and Forensic Medicine, Jordan University of Science and Technology, Irbid, Jordan

²International Mariinskaya Academy, Department of Medicine and Critical Care, Department of Philosophy, Academician Secretary of the Department of Sociology, Irbid, Jordan

³Poison Control Center in Riyadh, KSA

⁴Poison Control Center and Forensic Medicinal Chemistry, KSA

***Corresponding Author:** Ahed J Alkhatib, Department of Legal Medicine, Toxicology and Forensic Medicine, Jordan University of Science and Technology and International Mariinskaya Academy, Department of Medicine and Critical Care, Department of Philosophy, Academician Secretary of the Department of Sociology, Irbid, Jordan.

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Abstract

Patients who have been exposed to potentially harmful substances have an increased risk of presenting themselves with symptoms of poisoning when they visit the emergency department of the hospital. The medical team ought to have sufficient preparedness in order to deal with the situations that have been presented. The primary objective of this investigation was to carry out a literature search with the intention of locating recent developments in the management of poisoning cases that are treated in emergency rooms. According to the findings of this study, the medical experts who operate in the emergency department are able to address toxic and dangerous conditions that originate from a number of different sources. When taken as a whole, the personnel working in emergency departments ought to have the appropriate level of education and experience to deal with circumstances such as these.

Keywords: Department Room; Emergency Room; Toxins; Poisonous; Hospital

Introduction

This study investigates toxic studies and cases that can be experienced in emergency department. We used the following research engines to gather the appropriate articles: Google, Google scholar, PubMed, and Science direct.

Chemically contaminated persons

The care and treatment of chemically contaminated individuals in an emergency room setting carries with it the potential for significant consequences. It is possible for medical staff members to come into contact with potentially harmful chemicals either through skin touch or by the inhalation of volatile compounds or particulate matter. An exposure can result in symptomatic disease either via a direct chemical toxic effect or an odor-mediated psychologic response. Both of these mechanisms can be at play. Either scenario has the potential to substantially disrupt the operation of the ED and force the facility's evacuation. Hospital emergency departments are required to prepare for hazardous materials incidents in order to comply with the standards set forth by the Joint Commission on Accreditation of Healthcare Organizations and the regulations imposed by the Occupational Safety and Health Administration regarding participation in community hazardous materials incident emergency response plans [1].

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Food poisoning

In every part of the world, there is a problem with people getting sick because of tainted food. There is a huge increase in the mobility of toxins that are responsible for specific patterns of food poisoning, but these toxins are no longer restricted to particular geographic locations. It is conceivable for a patient to come at any emergency department with symptoms of food poisoning due to the ease with which food products can be transferred as well as the rise in the number of people who are traveling. Both of these factors contribute to the possibility. Emergency medical professionals who are able to recognize the specific symptoms of food poisoning are not only in a better position to begin the appropriate treatment in a timely manner, but they are also in a better position to contact health departments early on and, as a consequence, prevent more cases of food poisoning. In this article, many putative food-borne poisons are discussed, and the mechanisms of toxicity, predicted clinical presentation, and treatment options that are now recognized for each of these agents are described. In addition, the clinical presentation that is predicted for each of these agents is also described [2].

Illegal drugs

Concerning and all too widespread among young people is the behavior of using illegal drugs. This conduct needs to be addressed. It is estimated that one young person out of every four in the United States uses prescription medication for reasons other than those recommended by their doctor. Investigating the current trends of substance usage among adolescents was the purpose of our research. Researchers used the 37 participating sites of the Toxic (Toxicology Investigators Consortium) Case Registry, which is a tool for conducting surveillance across the nation, to carry out an observational cohort study on all adolescents (aged 13 - 18 years) who presented to emergency departments with drug misuse and required a bedside medical toxicology consultation between January 2010 and June 2013. The study was conducted as an observational cohort study. The ToxIC (Toxicology Investigators Consortium) Case Registry was utilized during the course of this research project. Of 3043 poisonings, 202 (7%) implicated drug consumption (139 [69%] were men). Following the consumption of medications requiring a prescription (56 [28%]), over-the-counter (OTC) drugs (51 [25%]), and illicit drugs (mostly synthetic cannabinoids and "bath salts"), 101 [50%] of the participants were determined to be under the effect of illicit substances. It was shown that dextromethorphan was the prescription medication that was abused more frequently than any other legal substance (24 [12%]). There was evidence that 74 individuals, or 37%, were taking multiple medications at the same time. One hundred sixty-three adolescents, or 81%, displayed symptoms; among these, 81% had impairments of the central nervous system, including psychosis (38%), agitation (30%), coma (26%), myoclonus (11%), and seizures (10%); and 66 adolescents, or 41%, displayed a specific toxidrome, which was most commonly sedative-hypnotic. One hundred sixty-three adolescents, or 81%, displayed symptoms; among these, 81% had impairments of Benzodiazepines were the drugs that were recommended to patients the most number of times, making up 46% of all prescriptions written. Antidotes were administered to a total of 28% of the adolescents. The antidotes that were administered the most frequently were naloxone, physostigmine, N-acetyl-cysteine and flumazenil. It was said that there was not a single person who lost their life. The fact that adolescents who present with drug misuse may have been exposed to a wide variety of therapeutics or illicit substances, as well as combinations of these substances, and the fact that they frequently display abnormalities in their central nervous systems, makes it difficult to obtain a reliable history of their drug use, is a conclusion that can be drawn from this. Regular toxicological testing is unable to detect the great majority of illegally misused legal and designer drugs in circulation today. As a result, frontline practitioners should maintain a high index of suspicion in order to protect themselves from being taken advantage of [3].

Marine toxicology

People from the United States are venturing out in greater numbers in pursuit of exotic locations, which increases the likelihood that they will come into contact with deadly marine life that hides on reefs and shallow marine waters. In this case report, a description of a patient who was envenomated by a stonefish was presented and a discussion of the research that has been done on how to treat and prevent the condition [4].

Acute poisoning

Acute poisoning is common in ERs. This study analyzed the epidemiology and characteristics of acute poisoning patients treated at China's Fujian Provincial Hospital Emergency Center. Researchers retrospectively evaluated genders, ages, causes of poisoning, types of poisons, routes of poisoning, emergency diagnoses, outcomes, and prognoses. In 2004 - 2009, 2867 individuals with acute poisoning were treated. 76.39% of the total number of patients, 2867, were between the ages of 18 and 40. In January, acute poisonings reached 11.33 percent. Alcohol poisoning (54.55%), pharmaceutical poisoning (24.95%), pesticide poisoning (5.6%), and medication poisoning (4.88%). Most drug poisoning patients were younger than 25 (56.44%), and their mean age was much younger than those with prescription or alcohol poisoning ($P < 0.01$). 69.54% of emergency patients were followed up, 30% were hospitalized, and 4 died. Alcohol poisoning and medication poisoning are widespread in metropolitan settings. Acute poisoning patients have a greater probability of survival if they obtain "pre-hospital emergency care-ED-hospital therapy" [5].

Psychoactive substances toxicity

This chapter explains how new psychoactive substances (NPS) have been linked to fatal overdoses beginning in 2010 and continuing to the present day. It provides a summary of the circumstances, antemortem symptoms, and adverse effects that have led to mortality following intake of one or more NPS. Additionally, it tabulates the concentrations, as well as the postmortem results, that have resulted from these intoxications. The consumption of NPS is associated with a variety of adverse health effects and unknown hazards for consumers. Data on the toxicity of many NPS are either limited or nonexistent, and the majority of the long-term toxicity and dangers remain unclear. In addition, the purity and composition of goods that contain NPS are frequently inconsistent or unknown, which leaves consumers at a great danger, as proven by the number of hospital emergency admissions and fatalities. Synthetic opioids pose the greatest risk to drug users because of the powerful depressive effects they have on the central nervous system. As a result, these drugs have been responsible for a large number of accidental deaths that have occurred all over the world. The synthetic cannabinoids appear to be the most unpredictable, as they lack a distinct toxidrome and have mechanisms of toxicity that are either poorly understood or not known at all, despite the fact that their negative effects appear to be concentrated in the cardiovascular system. The toxidromes that are typically experienced after ingestion of cathinones and phenethylamines are of a sympathomimetic and hallucinogenic nature. These toxidromes include the potential for the development of a serotonin syndrome, excited delirium, and cardiovascular effects that are potentially lethal. The majority of new psychoactive substances appear to have more severe negative effects in comparison to their traditional "parent" drugs, which include heroin, cannabis, and amphetamine. In recent years, there has been a startling spike in the number of fatalities related to NPS. We believe that this is the result of a move away from synthetic cannabinoids and cathinones and toward fentanyl analogues, which are considerably more poisonous and dangerously strong than their predecessors [6].

Children poisoning

Poisoning is one of the sorts of medical emergencies that affect young children in the United States more frequently than any other, and it is the root cause of a substantial portion of the visits that teenagers make to emergency departments. Poisoning remains a significant and persistent public health concern among children and adolescents, contributing to both mortality and morbidity rates. Those who work in the medical field are required to have a comprehensive understanding of the signs and symptoms of poisoning, as well as the specific therapeutic actions and antidotes that can be used to treat it. This is necessary because of the diverse nature of the poisonous compounds that are capable of causing poisoning. However, people who work in health care are obligated to identify, evaluate, and control the risks associated with exposures that are most likely to result in significant injuries, illnesses, or deaths. They are also responsible for initiating the proper management in order to reduce the likelihood that any kind of bodily injury would occur as a result of the exposure. The vast majority of youngsters who consume toxins will suffer no ill effects as a result [7].

Acute poisoning during pregnancy

The potential for an immediate threat to life or possible life-long implications for both the mother and the fetus, including the teratogenicity of the poison or its antidote, present a unique challenge for medical professionals when dealing with acute poisonings that occur during pregnancy. This is because of the potential for an immediate life threat. In this article, we discuss recent exposures that have had serious consequences for pregnant women in the United States. Between January 2010 and December 2012, the medical toxicology services at each of the 37 sites that make up the Toxicology Investigators Consortium (ToxIC) Registry of the American College of Medical Toxicology compiled a database of cases of poisoning involving pregnant women. We were able to identify all of these cases and determine how they were treated. Among the 17,529 exposure cases that were reported to the ToxIC Registry, 103 (0.6% of the total) were pregnant women. Eighty percent of these women experienced symptoms, and around one quarter of them displayed a particular toxidrome. The majority of instances (n = 53; 51.5%), most typically to pharmaceutical agents, comprised purposeful exposures. This was followed by inadvertent pharmaceutical exposures (10%) and withdrawal syndromes (9%). The use of non-opioid analgesics was observed the most frequently (31%), followed by the use of sedative-hypnotics and muscle relaxants (18%), opioids (17%), anti-convulsants (10%), and anti-depressants (10%). More than one third of the instances involved exposure to more than one substance, and 32 percent of the cases involved exposure to more than one drug class. Antidotes that were given out the most frequently were N-acetylcysteine (23%), sodium bicarbonate (10%), flumazenil (4%), and physostigmine (4%). Roughly half of all cases of acute poisoning in pregnant women that were brought to the attention of medical professionals were the result of purposeful exposures, the majority of which were over-the-counter analgesics and psychotropic medicines. Clinicians need to be aware of the specifics surrounding the critically poisoned pregnant lady, including the hazards to the mother and the unborn child, as well as the general principles of treatment [8]. Poisoning is the third most cause of injury-related hospitalizations among pregnant women [9], ranking behind only car accidents and falls as the top two causes. Each year, approximately 7500 - 8000 cases of poisoning in pregnancy are reported by phone to poison control centers in the United States of America [10-12]. This information comes from the National Poison Data System (NPDS), which is maintained by the American Association of Poison Control Centers (AAPCC). Because toxicological exposures may not only be harmful to the mother, but also result in fetal distress, teratogenicity, or even the death of the fetus, these kinds of situations create a particularly difficult task for the medical professionals who treat patients. This is because toxicological exposures may result in fetal distress, teratogenicity, or even the death of the fetus. There is a lack of evidence-based understanding on the topic of how to appropriately handle a pregnant woman who has been poisoned, as well as the safety and effectiveness of antidotes. Additionally, there is a lack of understanding on the topic of how to appropriately handle a pregnant woman who has been poisoned. This makes an already difficult position much more difficult [8].

Abrin toxicity: Case study

In the context of a discussion about known poisons and the clinical effects that they have, very few medical professionals are conversant with the potentially fatal poison known as abrin. Some of the common symptoms of abrin poisoning include nausea, vomiting, abdominal pain, and diarrhea, which may or may not be accompanied by bloody stools. Abrin poisoning can also cause death. On the other hand, the estimated lethal dose for humans is less than one microgram per kilogram; despite this, it is still possible to pass away as a result of comorbidities such as liver failure, renal failure, and cerebral edema. A male toddler who was 18 months old and had recently started complaining of a sudden onset of fever, vomiting, diarrhea, and dehydration came into the emergency room. Before the parents noticed three consecutive diapers containing colorful seeds that were identified by poison control as belonging to the *Abrus precatorius* plant, they had assumed that their child was suffering from a severe case of gastroenteritis. However, once the parents noticed the seeds, they immediately contacted poison control to have them removed. The moment they became aware of the seeds, however, they revised their decision. But in addition to that, the patient had an isolated and noticeably elevated alkaline phosphatase, and the tests couldn't figure out what the underlying clinical condition was that was causing it. The gastrointestinal symptoms exhibited by the youngster were comparable to those that have been documented in cases of abrin poisoning. In order to decrease the possibility of morbidity and, in some cases,

even death, it is necessary for parents and clinicians alike to be aware of the danger that the *Abrus precatorius* seed poses to the pediatric population. This is important since the danger is posed by the *Abrus precatorius* seed. Children are at a greater risk of accidentally ingesting these seeds because of their bright colors; as a result, they run the risk of suffering symptoms that could be potentially deadly. By making this case report available to the general public, our objective is that people will develop a greater awareness of this toxin. This includes the treatment of recognized cases as well as the possibility of a laboratory discovering an isolated raised level of alkaline phosphatase in the event that ingestion takes happened [13]. It is widely believed that the phytotoxin known as abrin, which can be found in the seeds of the *Abrus precatorius* plant, is among the most deadly poisons that can be found anywhere in the world. These seeds are known as Rosary peas, John Crow beads, and Crab's eye in common usage [9]. Another common name for them is Crab's eye. They are brilliant and crimson in color, and they come to a point at the end that is rounded and black. Abrin is responsible for the inhibition of both the elongation factors EF-1 and EF-2, which ultimately results in the cessation of protein synthesis and, in the end, cell death [10,11].

Poisoning cases requiring hospital transferring

Patients who require specialized care for conditions such as trauma, neurosurgical conditions, cardiac troubles, and other conditions are routinely transferred from one hospital to another using aeromedical services. These services are utilized both in prehospital and interhospital patient transfers. There is a dearth of material surrounding the application of aeromedical transport to patients who are having acute toxicologic difficulties. Those patients could potentially benefit from more information. This study's objectives were to conduct an in-depth analysis of, and provide a detailed description of, the patients who were transported by our aeromedical service during the course of the study. The investigation was carried out at an urban critical care transport service that included both ground and aeromedical units in its organization structure. During the course of the research project, the medical transportation service provided an annual average of 3,362 patient transports. The authors of the study tracked down and studied patient records that dated back to the period of time between the years 2000 and 2004 and contained a toxicologic emergency as the primary diagnosis. These records were identified in charts. Age, gender, the toxin(s) that were implicated, the treatment that was provided at the scene/bedside and en route by the transport crew, and other data (electrocardiogram [ECG] findings, serum levels), when relevant, were all included in the data that was abstracted. In addition, the treatment that was provided at the scene/bedside and en route by the transport crew was also included. As a direct consequence of these examinations, 133 patients had to be transferred to different facilities (for a total of 135 transports). The great majority were transported by air (82%) of the time. Carbon monoxide was discovered to be the most common hazardous exposure, accounting for 16% of all transfers. This finding is significant since it reveals the most widespread harmful exposure. Intubation was performed on fifty-seven percent of the patients, with the crew of the aircraft doing the surgery on eleven percent of the patients. Antidotes were administered to all 40 patients without incident. Naloxone and sodium bicarbonate were the antidotes that were utilized the most frequently. According to the findings, acute toxicologic emergencies accounted for a relatively insignificant proportion of the total number of transports. Intubation with an endotracheal tube was the extra operation that was carried out by flight crews the vast majority of the time. It is possible that the establishment of education and quality assurance programs by the services could benefit from the identification of common kinds of poisoning faced by flight crews [14].

Conclusion

Patients who have consumed poisonous substances that originated from a variety of different sources are frequently treated at emergency departments. This is not an uncommon occurrence. The medical personnel working in the emergency room should have adequate training to deal with cases involving toxic substances. It is essential to have clear policies and procedures in place in order to treat cases of poisoning, particularly those that are caused by animal sources like scorpions. This is especially true in the treatment of cases involving animal sources of poisoning.

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