People's Democratic Republic of Algeria
Ministry of High Education and Scientific Research
University of Kasdi Merbah Ouargla
Faculty of Medicine
Department of Medicine

Knowledge status of emergency physicians on the initial management of acute poisoning in Public Hospital Mohamed Boudiaf Ouargla

THESIS SUBMITTED TO OBTAIN A DOCTORATE DEGREE IN MEDICINE

Presented by:

BOUROUBA Mouad

Supervised by:

Pr KERDOUN Mohamed Amine

In front of the jury members consisting of:

Pr DJOUADI Abdellah	**President**	**Professor of psychiatry**
Pr KERDOUN Mohamed Amine	**Supervisor**	**Professor of toxicology**
Dr MAZOUZI Mohamed Laid	**Examinator**	**Assistant professor of general surgery**

Academic year:

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DEDICATION

DEDICATION

With the expression of my gratitude, I dedicate this modest work to those whom, whatever the terms embraced, I would never be able to express my sincere love.

To the woman who suffered without letting me suffer, who never said no to my demands and who spared no effort to make me happy: my lovely mother Samira.

To the soul of my dear father Abdelaziz today I gather on his grave and say to him with pride also: « Rest in Peace and God keep you in his vast paradise ».

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TABLE OF CONTENTS

Table of contents

LIST OF TABLES

List of tables

LIST OF FIGURES

List of figures

ABSTRACTS

Abstracts

Abstract:

Introduction: Acute poisoning is a critical medical situation that necessitates immediate transportation of patients to the hospital, regardless of the quantity or type of toxin involved. Early management decisions are necessary to achieve the optimal possible outcome for the patient. **Materials and methods:** This is a monocentric descriptive study that employed qualitative and quantitative methods of data collection in the period from 09/01/2024 to 05/02/2024 at Public Hospital Mohamed BOUDIAF in OUARGLA. The main objective of which is to assess the knowledge, attitude, and practice of emergency physicians toward the initial management of acute poisoning. Sample size comprised of all emergency physicians who met subject's inclusion criteria. Structured questionnaire was used to collect the data. Data were entered and analyzed in the statistical program SPSS version 25. **Results:** Sixty-nine emergency doctors participated in the study. Only (17.4%) of the participant doctors had an unsatisfactory level of general knowledge about acute poisoning. Likewise, only (14.5%) had an insufficient level of knowledge in the initial management on acute poisoning. The study found out that with higher education level and training on courses related to emergency care, knowledge and skills of emergency physicians on the initial management of acute poisoning increased. Emergency physicians in advanced age (above 30 years) had a higher mean score (6 ± 0.95) of positive attitude compared with those physicians with younger age. **Conclusion:** Emergency physicians should be trained in poisoning evaluation, clinical presentation, and management. Additionally, refresher training should be offered for those already trained. It is recommended that the emergency department establish and use flowcharts to facilitate the identification and management of poisoned casualties.

Key words: acute poisoning, knowledge, attitude, initial management

الملخص:

المقدمة: التسمم الحاد حالة طبية حرجة تستلزم نقل المرضى فوراً إلى المستشفى، بغض النظر عن كمية أو نوع المادة المسببة لهذا التسمم الحاد. والقرارات العلاجية المبكرة ضرورية لتحقيق النتيجة المثلى الممكنة للمريض. **المواد والأساليب:** هذه دراسة وصفية أحادية المركز استخدمت أساليب نوعية وكمية لجمع البيانات في الفترة من 2024/01/09 إلى 2024/02/05 في المؤسسة العمومية الاستشفائية محمد بوضياف بورقلة. والهدف الرئيسي منها هو تقييم معرفة الأطباء بمصلحة الاستعجالات وموقفهم وممارستهم تجاه الرعاية الأولية والعلاج للتسمم الحاد. ويتكون حجم العينة من جميع الأطباء العاملين بمصلحة الاستعجالات الذين يستوفون معايير الإدراج في هذه الدراسة. واستُخدم استبيان هيكلي لجمع البيانات والتي أدخلت وجرى تحليلها في البرنامج الاحصائي SPSS النسخة 25. **النتائج:** شارك في هذه الدراسة 69 طبيب استعجالات, حيث خلصت النتائج الى ان فقط 17.4 بالمئة من الأطباء المشاركين كان لهم مستوى غير كاف من المعرفة اللازمة حول التسممات الحادة, اما بالنسبة للرعاية العلاجية الأولية للتسمم الحاد فقد اظهر معظم المشاركين احاطة تامة و معرفة كافية بالموضوع على خلاف 14.5 بالمئة الذين لم يكن لهم معرفة كافية بالتعامل الأولي مع التسمم الحاد, في حين كان لدى أطباء الاستعجالات الذين في سن متقدمة (فوق 30 سنة) درجة أعلى في المتوسط (6 ± 0.95) من الموقف الإيجابي مقارنة بالأطباء الأصغر سناً تجاه المرضى المصابين بالتسمم الحاد. **الخاتمة:** التدريب والخبرة الميدانية مهمان في مواجهة حالات التسمم الحاد، ومنه ينبغي على الإدارات الصحية توفير تدريب وتكوينات نظرية وتطبيقية لأطباء الإستعجالات في التقييم السريري والطرق العلاجية الناجعة في حالات التسمم الحاد.

الكلمات المفتاحية: التسمم الحاد، المعرفة، الموقف الإيجابي، الرعاية العلاجية الأولية.

Résumé :

Introduction : L'intoxication aiguë est une situation médicale critique qui nécessite le transport immédiat des patients à l'hôpital, quelle que soit la quantité ou le type de toxine impliquée. Des décisions de prise en charge précoces sont nécessaires pour obtenir un résultat optimal pour le patient. **Matériels et méthodes :** Il s'agit d'une étude descriptive monocentrique qui a utilisé des méthodes qualitatives et quantitatives de collecte de données pour la période du 09/01/2024 au 05/02/2024 à l'EPH de Mohamed BOUDIAF à OUARGLA. Son principal objectif est d'évaluer l'état de connaissance, l'attitude et la pratique des médecins d'urgence en ce qui concerne la prise en charge initiale de l'intoxication aiguë. L'échantillon comprenant tous les médecins urgentistes qui correspondent aux critères d'inclusion du sujet. Un questionnaire structuré a été utilisé pour recueillir les données. Les données ont été saisies et analysées dans le programme statistique SPSS version 25. **Résultats :** Soixante-neuf médecins urgentistes ont participé à l'étude. Seuls (17,4 %) des médecins participants avaient un niveau insatisfaisant de connaissance générale sur l'intoxication aiguë. De même, seuls (14,5 %) avaient un niveau de connaissances insuffisant dans la prise en charge initiale de l'intoxication aiguë. L'étude a révélé qu'avec le niveau d'éducation supérieur et les formations liées aux soins d'urgence, les connaissances et les compétences des médecins urgentistes sur la prise en charge initiale des intoxications aiguës ont augmenté. Les médecins d'urgence en âge avancé (plus de 30 ans) avaient une moyenne plus élevée (6 ± 0,95) d'attitude positive par rapport à ceux d'âge plus jeune à propos des patients atteints d'une intoxication aiguë. **Conclusion :** Les médecins urgentistes doivent être formés sur l'évaluation des intoxications aigues, la présentation clinique et la prise en charge. En outre, des formations de rafraîchissement devraient être offertes aux personnes déjà formées. Il est recommandé aux administrations sanitaires d'établir et d'utiliser des tableaux d'algorithme de décision pour faciliter l'identification et la prise en charge des victimes d'une intoxication aigue.

Mots clés : intoxication aigue, connaissance, attitude, prise en charge initiale.

INTRODUCTION

Introduction:

Medical toxicology is one of the most important and dynamic fields in medicine today, since the practicing physician is continually faced with the management of poisoning, drug overdose, and adverse drug effects.

The abuse of both prescription and illicit drugs continues unabated. Because the process of drug approval is more rapid, it is often not until the agent has been in use for some time, during the post marketing period, before its toxicity is fully appreciated.[1]

Poisoning is a major epidemic of non-communicable disease in the present century. Among the unnatural deaths, deaths due to poisoning come next only to road traffic accident deaths. In earlier times, the poisoning deaths from pesticides were mainly accidental but easy availability, low cost and unrestricted sale have led to an increase in suicidal and homicidal cases as well. Pesticides which were invented to protect crops from rodents, insects; and humans from starvation have themselves become an important contributor to unnatural deaths. In the developed world, poisoning due to narcotics and drug over dosage is far more common than due to pesticides.

World Health Organization (WHO) estimated 0.3 million people die every year due to various poisoning agents. The death rate due to poisoning is much higher in the low- and middle-income countries of Europe than in any other region of the world [2].

OBJECTIVES

Objectives:

- **Main objective:**
  - This study aims to assess the knowledge, attitude, and practice of emergency physicians toward the initial management of acute poisoning at Public Hospital Mohamed Boudiaf-Ouargla.
- **Specific objectives:**
  - Determine the physicians' knowledge and practice in prioritizing rapid assessment and intervention in the management of poisoned casualties at Public Hospital Mohamed Boudiaf-Ouargla.
  - Determine the physicians' attitude towards poisoned casualties at Public Hospital Mohamed Boudiaf-Ouargla.
  - Determine if physicians' social-demographic characteristics has any impact on the initial management of poisoning at Public Hospital Mohamed Boudiaf-Ouargla.

PART ONE:
THEORETICAL PART

CHAPTER A:

GENERALITIES ABOUT ACUTE POISONING

1. Introduction:

Acute poisoning is a prevalent cause for patients who require medical care in emergency rooms and are hospitalized globally. Furthermore, it is a prominent factor contributing to morbidity and mortality in various regions. Due to the accessibility and applications of a variety of drugs and other poisonous substances, toxic substances connected with diseases and mortality vary by region.

2. Definition:

a. Poison:

One could define a poison as any agent capable of producing a deleterious response in a biological system, seriously injuring function or producing death. This is not, however, a useful working definition for the very simple reason that virtually every known chemical has the potential to produce injury or death if it is present in a sufficient amount. Paracelsus (1493–1541), a Swiss/German/Austrian physician, scientist, and philosopher, phrased this well when he noted, “What is there that is not poison? All things are poison and nothing [is] without poison. Solely the dose determines that a thing is not a poison.”[1]

Poison is defined as any chemical that has the ability to alter or degrade human physiology through general or local cell damage or death as a result of its chemical action. It's a global issue that takes up a lot of health-care resources and leads to a lot of fatalities that could have been avoided. The underdeveloped world bears the brunt of serious poisoning. Poisoning-related morbidity and mortality, on the other hand, is a major public health concern in the developed world. Poisoning is a common cause of medical visits and hospitalization around the world. In many regions of the world, it is a leading cause of morbidity and mortality. Poisoning episodes are thought to cause more than one million diseases each year around the world[2]

The range of adverse effects caused by substances is frequently wide. Certain impacts can be detrimental, while others may not have negative consequences. In the field of therapeutics, it is

common for drugs to elicit many effects. However, often only one impact is directly linked to the primary purpose of the therapy. Any additional effects are sometimes referred to be undesired or side effects specific to the drug's therapeutic indication[3].

However, some of these side effects may be desired for another therapeutic indication. For example, the “first-generation” antihistamine diphenhydramine (Benadryl) is effective in reducing histamine responses associated with allergies, but it readily enters the brain and causes mild central nervous system (CNS) depression (drowsiness, delayed reaction time). With the advent of selective histamine receptor antagonists that do not cross the blood–brain barrier and thus do not have this CNS-depressant side effect, diphenhydramine is used less commonly today as an antihistamine. However, it is widely used as an “over-the-counter” sleep remedy, often in combination with analgesics (e.g., Tylenol PM, Excedrin PM), taking advantage of the CNS-depressant effects. Some side effects of drugs are never desirable and are always deleterious to the well-being of humans. These are referred to as the adverse, deleterious, or toxic effects of the drug.[1]

b. Acute poisoning:

Acute poisoning or toxicity is defined as the effects of a substance that result either from a single exposure or from multiple exposures in a short period of time (usually less than 24 hours); the effects should occur within 14 days of the administration of the substance.

All poisoning patients should be handled as though they had a potentially fatal intoxication, even though they may not look immediately sick[4].

Acute poisoning is a common emergency medicine presentation. Between 150 and 400 acute poisoning presentations annually can be expected for each 100 000 population served by an emergency department [5].

Acute poisoning is a dynamic medical illness that frequently represents a potentially life-threatening exacerbation of a chronic psychosocial disorder. However, this is a highly heterogeneous patient population: deliberate self-poisoning, recreational drug abuse,

occupational poisoning and envenoming challenge with myriad potential presentations. The clinician needs a robust and simple clinical approach that can address this heterogeneity, but which allows the development of a management plan tailored to the individual patient at that particular presentation at that particular medical facility[6].

3. Pediatric poisoning:

Acute pediatric poisonings usually affect preschool-aged children or adolescents. Children younger than five years old usually swallow a household product or prescription by accident, while teenagers may use drugs or alcohol recreationally or during an attempted suicide[7].

Young children often present to the emergency department without symptoms, so it is important to differentiate exposures (e.g., found in an area with pills available) from actual ingestions. Ingestions in this age group usually involve a single medication or household product. Toddlers often taste objects that appear attractive and may share them with a younger companion. Many medications are remarkably similar in color, size, and shape to candy. With liquids, parents may report children taking a single or multiple swallows of a substance before spitting it out. Estimate the volume of a swallow to be approximately 0.25 ml/kg.

Occasionally, previously well children may present with an acute change in mental status or a clinical decompensation. A high level of suspicion is required to discover and manage a surreptitious ingestion in these cases[7].

Adolescent ingestions are generally non-accidental. The ingestions may be impulsive whether stemming from recreational use or psychiatric disorders (mood disorders, schizophrenia, substance abuse), and the history may be unclear at the time of presentation. These ingestions often involve multiple medications, illicit drugs, and alcohol, and frequently result in symptoms. It is also important to consider that the patient may be despondent over an unwanted pregnancy or attempting to self-induce an abortion. The patient rarely shares this information, so obtain a pregnancy test in all female overdoses[8].

4. Mechanism of poisoning:

Poison is a quantitative concept, almost any substance being harmful at some doses but, at the same time, being without harmful effect at some lower dose. Between these two limits, there is a range of possible effects, from subtle long–term chronic toxicity to immediate lethality. Vinyl chloride may be taken as an example. It is a potent hepatotoxicant at high doses, a carcinogen with a long latent period at lower doses, and apparently without effect at very low doses. Clinical drugs are even more poignant examples because, although therapeutic and highly beneficial at some doses, they are not without deleterious side effects and may be lethal at higher doses. Aspirin (acetylsalicylic acid), for example, is a relatively safe drug at recommended doses and is taken by millions of people worldwide. At the same time, chronic use can cause deleterious effects on the gastric mucosa, and it is fatal at a dose of about 0.2 – 0.5 g/kg. Approximately 15% of reported accidental deaths from poisoning in children result from ingestion of salicylates, particularly aspirin[8].

The importance of dose is well illustrated by metals that are essential in the diet but are toxic at higher doses. Thus, iron, copper, magnesium, cobalt, manganese, and zinc can be present in the diet at too low a level (deficiency), at an appropriate level (maintenance), or at too high a level (toxic). The question of dose – response relationships is fundamental[9]

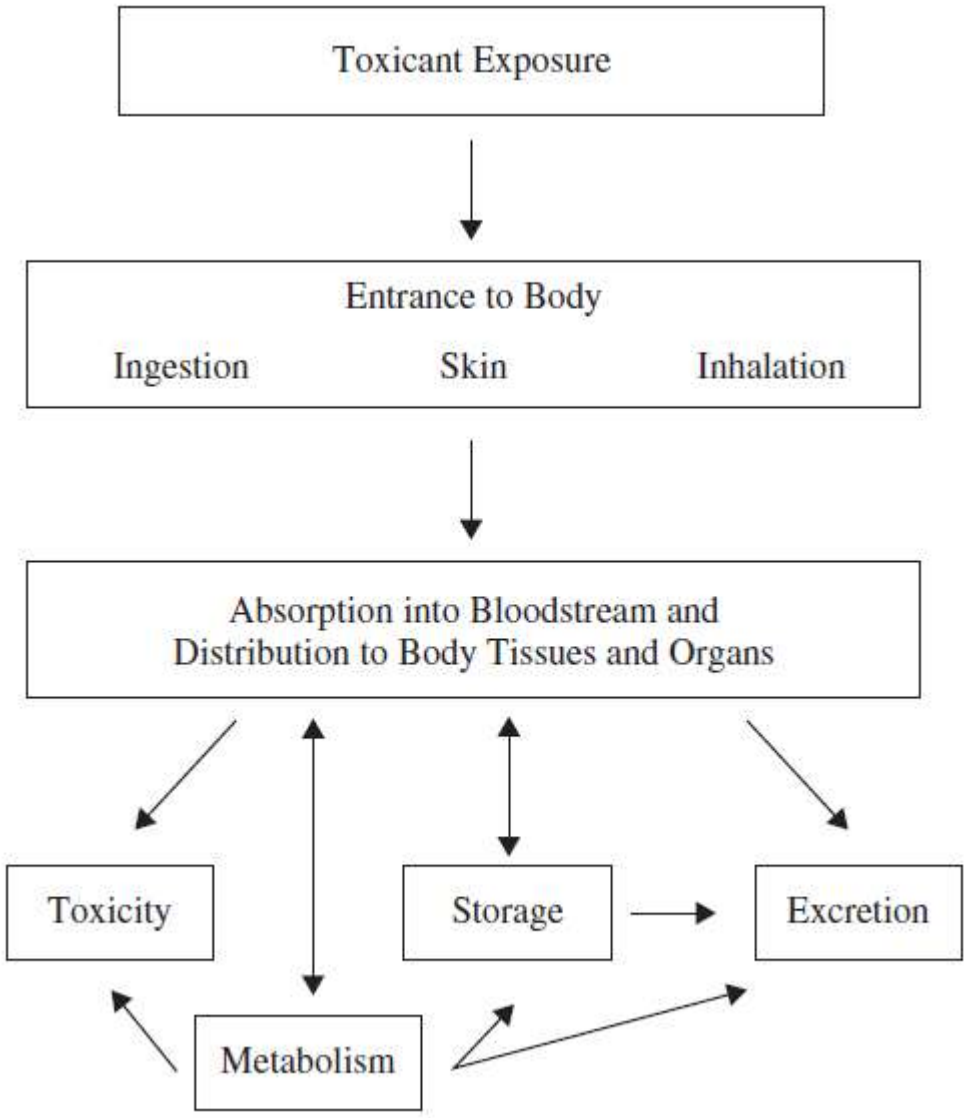

Figure A.1. Fate and effect of toxicants in the body[9]

CHAPTER B:

DIAGNOSIS AND CAUSES OF ACUTE POISONING

1. PRINCIPLES OF DIAGNOSIS

The primary duty of a medical practitioner is to assess the severity of poisoning in order to determine the need for treatment. If intervention is deemed necessary, the physician must then make a decision regarding the most suitable course of treatment[1].

Poisoning cases can generally be classified into three categories:

1.1. Exposure to a known toxic substance:

Physicians must assess if the degree of exposure to a recognized toxic agent justifies further therapy beyond first aid or emergency treatment. However, history can be wrong. Although the actual amount of poison ingested by the patient is most likely unknown, the physician can estimate the maximum amount. Examining the container and asking family or coworkers may reveal the amount of poison previously present. Comparing the missing quantity to the deadly dosage.

Reported minimal lethal doses can indicate the relative risks of dangerous drugs, but fatal dosages can vary substantially. Treatment must be initiated immediately if the predicted amount of toxin causes significant or potentially deadly poisoning.

1.2. Exposure to an unidentified substance that may possess toxic properties:

If a patient is exposed to an unknown drug, immediately identify the constituents. This is problematic due to the numerous trade-named mixes and their often-changing formulations. Trade-named chemical combinations may not specify constituents on the label, making it difficult to assess exposure without contacting the producer.

1.3. Instances of undetermined origin:

Where poisoning must be taken into account as a potential cause in the process of differential diagnosis[3].

2. SYMPTOMS OF MAIN POISONING TYPES:

2.1. Ingested Poisons:

- **Botulism:**

The primary clinical presentations of acute botulism include vomiting, diplopia, and muscle paresis.

In cases of adult poisoning, the onset of symptoms often occurs within a range of 8 hours to 8 days following ingestion. These symptoms commonly include nausea, vomiting, and in some instances, diarrhea and abdominal discomfort.

The individual exhibits a gradual decline in muscle strength accompanied by pronounced fatigue, drooping of the upper eyelids, impaired speech, impaired vision characterized by blurriness or double images, enlarged pupils, challenges with swallowing, weakness and paralysis of the muscles involved in respiration, as well as paralysis affecting all four limbs. The presence of gastrointestinal symptoms may be lacking. The abolition of deep tendon reflexes is not observed. The pupillary response to light has the potential to be reduced or completely absent. The presence of the toxin can be detected in various sources such as food, blood, excrement, stomach contents, or tissues. Progressive paralysis leading to respiratory impairment may be observed in babies. The paralysis progressively subsides over a period of around 3 to 4 weeks[10].

- **Bacterial food poisoning:**

The primary symptoms of acute bacterial food poisoning include emesis and gastrointestinal distress. There have been no documented cases of chronic poisoning[11].

Symptoms such as nausea and vomiting, diarrhea, abdominal cramps or pain, and weakness manifest in affected individuals, with the duration of the incubation period being contingent upon the specific organisms involved.

The symptoms typically exhibit a progression over a period of 12 to 24 hours, followed by a subsequent regression. The severity of abdominal discomfort and tenesmus can be significant. Prostration, moderate pyrexia, dehydration, and hypovolemic shock may occasionally manifest[3].

2.2. Inhaled Poisons:

The similarities between acute intoxication with volatile chemicals and ethanol are evident. The use of inhalants is associated with desirable outcomes such as the quick initiation of a pleasurable sensory experience, sometimes referred to as a "high," followed by the prompt cessation of central nervous system (CNS) effects, all while minimizing the occurrence of negative symptoms. The first consequences of inhaling vapors during the utilization of volatile substances bear resemblance to the early stages of anesthesia, characterized by an initial period of stimulation that entails sensations of lightheadedness, enthusiasm, reduced inhibitions, and impulsive actions. The onset of central nervous system symptoms occurs promptly, typically within one minute following inhalation of the vapors, and these symptoms subside shortly after discontinuation of exposure. Nevertheless, the duration of the high can be prolonged for several hours through the continuous inhalation of the vapors.

As the dosage of the inhalant escalates, individuals may experience symptoms such as slurred speech, diplopia, dizziness, ataxia, and disorientation, which bear resemblance to the effects of ethanol intoxication. The consumption of excessive amounts of inhalants can lead to the manifestation of auditory or visual hallucinations. The occurrence of distressing hallucinations serves as a distinguishing factor between inhalant usage and ethanol intoxication.

The euphoric effects of the inhalant diminish and are replaced by symptoms such as tiredness, sleepiness, and headache when its usage is not repeated. Coma is an infrequent occurrence in the context of volatile substance consumption. The adverse effects encompass several symptoms such as irritation of the mucous membranes, including rhinorrhea, salivation, sneezing, coughing, conjunctival erythema, nausea, vomiting, and abdominal discomfort. Additionally, respiratory tract irritation may manifest as dyspnea and wheezing.[12]

2.3. Absorbed Poisons (through the skin):

Exposure to a wide range of industrial and environmental xenobiotics can lead to the occurrence of cutaneous injuries resembling burns. While the primary cause of skin injury from xenobiotics is typically chemical reactivity rather than heat damage, the clinical manifestations of these two types of injuries often exhibit similar characteristics. Harmful xenobiotics have the potential to function as either oxidizing or reducing agents, corrosive substances, protoplasmic toxins, desiccating agents, or vesicant agents. Frequently, an injury may exhibit initial characteristics that suggest a minor or superficial nature, such as subtle erythema, blanching, or skin discoloration. During the following 24 to 36 hours, there is a possibility of the development of widespread necrosis in both the skin and its underlying tissues.

Thermal damage may also arise as a consequence of toxicological exposure. An instance of an exothermic reaction can occur when elemental phosphorus or sodium comes into contact with a liquid, leading to the possibility of a thermal burn. Under these conditions, the resultant products of reactivity, namely phosphoric acid and sodium hydroxide, have the potential to cause further chemical harm. In contrast, the direct contact of skin with a swiftly expanding gas, such as nitrous oxide emitted from a whipped cream cartridge or compressed liquid nitrogen, or with frozen items like dry ice, can result in a freezing damage often known as frostbite.[4]

2.4. Plant Poisoning:

- **Castor bean and jequirity bean:**

The principal manifestations of poisoning with these beans are vomiting, diarrhea, and circulatory collapse.

Acute poisoning (from ingestion):

Following a period ranging from 2 hours to several days, individuals may experience a series of symptoms including mouth burning, nausea, vomiting, diarrhea, stomach pain, sleepiness, disorientation, cyanosis, stupor, circulatory collapse, retinal hemorrhage, hematuria, convulsions, and oliguria. These symptoms have the potential to escalate and lead to fatal

outcomes in the form of uremia, occurring within a maximum of 12 days subsequent to the poisoning event. Hemorrhage may be present in the vomitus and stools.

Chronic poisoning (from inhalation of dust from castor bean pomace):

Dermatitis and inflammation of the nose, throat, and eyes. Instances of asthmatic attack have also been reported from exposure to the dust.[3]

2.5. Carbon Monoxide Poisoning:

The initial manifestations of carbon monoxide (CO) poisoning frequently exhibit nonspecific characteristics, which can be easily mistaken for other ailments, commonly resembling a viral condition[13].

After experiencing a brief period of exposure, the majority of patients exhibit symptoms such as headache, nausea, and varying levels of cognitive impairment, which promptly subside with the administration of oxygen therapy. The occurrence of brief loss of consciousness is frequently observed in historical records. Possible symptoms include:

- **Central nervous system:**
  - Headache, nausea, dizziness
  - Confusion, poor concentration, mini mental status examination (MMSE) errors
  - Incoordination and ataxia
  - Seizures and coma
- **Cardiovascular:**
  - Tachycardia and hypertension
  - Ischemic ECG changes
  - Hypotension
  - Dysrhythmias
  - Acute myocardial infarction

- **Respiratory:**
  - Non-cardiogenic pulmonary oedema
- **Metabolic:**
  - Lactic acidosis
  - Rhabdomyolysis
  - Hyperglycemia
- **Other:**
  - Disseminated intravascular coagulation
  - Bullae, alopecia, sweat gland necrosis

Typically, enduring neurological consequences become apparent following the occurrence of poisoning and are observed in approximately 30% of those who survive the incident within a span of one month. At the 12-month, a persistent occurrence of neuropsychiatric sequelae is observed in approximately 6-10% of individuals. The symptoms associated with this condition are characterized by their non-specific nature, including a range of manifestations such as alterations in personality, diminished ability to concentrate, cognitive decline, episodes of psychosis, motor abnormalities resembling, Parkinson's disease, impaired coordination (ataxia), peripheral nerve damage, and auditory impairment.[5]

2.6. Medication Overdose:

- **Acetaminophen (Paracetamol) overdose:**

The progression of acute acetaminophen toxicity can be categorized into four distinct phases. In the initial phase, hepatic injury has not yet manifested, and even individuals who eventually experience significant hepatotoxicity may not exhibit any symptoms. The clinical manifestations, if observed, are not specific and can encompass symptoms such as nausea, vomiting, general discomfort, paleness, and excessive sweating. The laboratory parameters assessing liver function exhibit normal values. In exceptional instances of a substantial overdose, a reduction in cognitive function, metabolic acidosis, and potentially fatal outcomes

might manifest during this phase, even in the absence of observable indications or symptoms of liver damage. It is imperative to conduct a comprehensive assessment of potential alternative factors before only attributing these clinical observations to acetaminophen[14].

Stage II signifies the initiation of hepatic impairment, manifesting in less than 5% of individuals experiencing an overdose event. Aspartate aminotransferase (AST) serves as a highly sensitive and readily accessible indicator for detecting the initiation of hepatotoxicity. Notably, deviations in AST levels consistently manifest prior to the manifestation of tangible liver impairment, such as prolonged prothrombin time (PT), elevated international normalized ratio (INR), increased bilirubin concentration, hypoglycemia, and metabolic acidosis. During the second stage, it is observed that the increase in aspartate aminotransferase (AST) levels often begins within 24 hours after ingestion, and it becomes almost universally evident within 36 hours. In individuals with the most severe cases of poisoning, it has been observed that concentrations of aspartate aminotransferase (AST) may exhibit an increase within a time frame as short as 12 hours following consumption. The symptoms and signs exhibited during stage II of liver injury demonstrate variability in accordance with the severity of the condition. According to established norms, the condition known as acetaminophen-induced hepatotoxicity is characterized by the presence of a peak aspartate aminotransferase (AST) concentration over 1000 IU/L. While decreased peak concentrations of AST may indicate some level of hepatic tissue injury, their clinical significance is often minimal[14].

Stage III, which is characterized by the peak of hepatotoxicity, often manifests during a timeframe of 72 to 96 hours following intake. Stage III is characterized by clinical signs such as fulminant hepatic failure accompanied by encephalopathy, coma, or in rare cases, exsanguinating bleeding. The laboratory findings exhibit considerable variability, with a prevalence of AST and alanine aminotransferase (ALT) levels beyond 10,000 IU/L, even in individuals lacking further indications of hepatic insufficiency. Abnormalities in prothrombin time (PT) and international normalized ratio (INR), glucose levels, lactate levels, creatinine levels, and pH are crucial factors that significantly impact prognosis and treatment, surpassing the significance of the degree of aminotransferase concentration rise[14].

Renal function abnormalities are infrequent in general, but they manifest in approximately 25% of patients experiencing substantial hepatotoxicity and in over 50% of those with hepatic failure. Renal anomalies have been observed to exhibit a higher prevalence following prolonged and repetitive administration of excessive doses, particularly among those in the adolescent and young adult age groups. Following acute ingestions, it is common for serum creatinine levels to see an increase within a time frame of 2 to 5 days after ingestion. The peak of these elevations is commonly observed on the seventh day, with a range spanning from 3 to 16 days. Subsequently, it takes around one month for the serum creatinine levels to return to normal. The occurrence of overt renal failure requiring hemodialysis is predominantly observed in patients with significant hepatic damage. On rare occasions, there may be instances of moderate renal insufficiency where there are no accompanying increases in aminotransferase levels[14].

Mortality resulting from fulminant hepatic failure typically manifests within a time frame of 3 to 5 days subsequent to an acute overdose. Death occurs as a consequence of either singular or mixed consequences arising from multiorgan failure, encompassing bleeding, acute respiratory distress syndrome, sepsis, and cerebral edema. Patients that successfully endure this period transition into stage IV, which is characterized as the phase of recuperation. Survivors exhibit full liver regeneration, and there have been no documented instances of enduring hepatic impairment. The recovery rate exhibits variability, with survivors of acute overdoses typically demonstrating normalization of AST, pH, PT and INR, and lactate levels within a span of 7 days. The duration of increased ALT levels may exceed that of AST, and creatinine levels may remain elevated for a period beyond one month. Severely poisoned patients experience a significantly extended recovery period, with the presence of histologic abnormalities potentially persisting for several months.[4]

- **Opioids painkillers overdose:**

Lethargy is a prevalent symptom observed in cases of mild to moderate overdose. The size of the pupils tends to be small. The blood pressure and pulse rate exhibit a decrease, the bowel sounds demonstrate a reduction, and the muscles typically display a state of flaccidity.

At elevated dosages, the state of coma is typically followed by a decrease in respiratory function, leading to apnea, which frequently culminates in an abrupt fatality. Noncardiogenic pulmonary edema can manifest, frequently following resuscitation and the use of the opiate antagonist naloxone.

Seizures following opioid overdose are infrequent, however they do occur sporadically in association with specific substances such as dextromethorphan, meperidine, propoxyphene, and tramadol. Patients with renal impairment who get many doses of meperidine may experience seizures due to the build-up of the metabolite normeperidine[8].

Patients who experience severe propoxyphene intoxication may exhibit cardiotoxicity that is comparable to the cardiotoxic effects observed with tricyclic antidepressants and quinidine.

Certain recently developed synthetic opioids exhibit a combination of agonist and antagonist properties, leading to uncertain outcomes in cases of overdose.

The manifestation of opioid withdrawal syndrome includes symptoms such as anxiety, piloerection (goosebumps), gastrointestinal cramps and diarrhea, as well as insomnia.[8]

3. INVESTIGATIONS:

The utilization of investigations in cases of acute poisoning serves two primary functions: screening tests and particular aims.

Screening pertains to the execution of a medical assessment and/or diagnostic examination in individuals who do not exhibit symptoms, with the aim of potentially achieving early detection that could result in enhanced prognosis. Screening tests in patients with acute poisoning are conducted with the purpose of detecting hidden harmful ingestions that require prompt and targeted treatment[4].

The 12-lead electrocardiogram (ECG) and the measurement of serum paracetamol levels are the screening procedures that are typically advised for acute poisoning cases.

The electrocardiogram (ECG) is a widely accessible and non-invasive diagnostic tool that aids in the detection of hidden yet potentially life-threatening cardiac conduction abnormalities, such as those associated with tricyclic antidepressant cardiotoxicity[15].

If there is suspicion of paracetamol poisoning following the initial risk assessment, there is no need for a screening paracetamol level. Alternatively, it is recommended to do a timed paracetamol level evaluation within 4 hours after administration in order to further evaluate potential risks[16].

The presence of co-morbidities. Following a thorough risk assessment and implementation of appropriate supportive treatment, it is possible that no additional investigations will be necessary beyond the first screening electrocardiogram (ECG) and serum paracetamol concentration. In the case of a young and otherwise medically fit individual who shows normal cognitive function and stable vital signs, it is not conventional to routinely do supplementary examinations such as electrolyte analysis, complete blood count, liver function tests, and coagulation investigations. Selective ordering of investigations is often employed in cases when it is expected that the obtained results will be beneficial for the purposes of risk assessment or management[2].

Management decisions in cases of poisonings are typically determined by the risk assessment and subsequent clinical course experienced by the majority of patients. Drug concentrations typically do not contribute much to the process of decision making. Several compounds have been identified where serum levels can be used to aid in risk assessment or management decisions. These agents include Carbamazepine, Lithium, Salicylate, Digoxin, Ethanol, Ethylene glycol, Paracetamol, and Phenobarbitone[17].

The utilization of qualitative urine screenings to detect drugs of abuse, such as opioids, benzodiazepines, amphetamines, cocaine, barbiturates, and cannabinoids, infrequently results in significant changes to the treatment approach for patients with acute poisoning. Patients who are experiencing acute intoxication with one or more of these substances can be treated based on their individual clinical symptoms and presentation. Instances of both false positives and false negatives can arise. In cases where a patient exhibits a positive result without concurrent

symptoms of intoxication, it is uncommon for there to be any significant changes in acute medical therapy[5].

CHAPTER C:

GENERAL APPROACH ON THE TREATMENT OF ACUTE POISONING

1. Introduction:

The standard protocol for managing a poisoned patient requires immediate resuscitation and stabilization, as well as thorough clinical and laboratory assessment. Time-sensitive interventions, when suitable, encompass the administration of antidotes, gastrointestinal decontamination, and increased elimination methods. These assessments are mostly determined on an individual basis, taking into account the level of exposure, the characteristics of the patient, and the symptoms displayed. The substantiation for particular treatments is frequently founded on restricted facts, such as case reports or theoretical rationale. Thankfully, there is a growing availability of clinical recommendations that are derived from evidence and expert opinion, which can aid in making informed decisions [18].

2. Resuscitation

Any instance of poisoning, particularly those that are deliberate and sudden in onset, and have the potential to rapidly worsen, should be regarded as a grave matter. The management process begins with a comprehensive evaluation of the airway, breathing, circulation, and neurological function. Standard interventions, such as endotracheal intubation, ventilatory support, and the administration of fluids, inotropes, or vasopressors, are initially implemented based on established guidelines. Restoring volume levels is a crucial aspect of treatment for addressing volume depletion, as it enhances the functioning of the circulatory system and optimizes renal function, as well as the clearance of certain medications (such as lithium, dabigatran, baclofen, and digoxin). Seizures and agitation are managed by using carefully adjusted amounts of benzodiazepines[18].

3. History and investigation:

After addressing life-support procedures, focus on other parts of the case. Acquire all accessible historical data; additional investigations may be required subsequently. Thoroughly assess the patient and any related materials for any indications that may provide clarity regarding the issue at hand. In the event of a suspected overdose, the pills or capsules can be recognized by examining the drug imprint provided by the manufacturer[9].

- Determine the kind of the items that were appropriated, the quantity involved, the specific time of the incident, and the means by which they were acquired.
- Inquire as to whether alcohol was also ingested.
- Determine if there has been any occurrence of emesis subsequent to the act of eating.
- Collect information on the patient's previous medical conditions, present medicines, and any known allergies.
- Determine whether a written document indicating an individual's intention to commit suicide was present.
- Inquire about the patient's pregnancy status.
- Accounts from many sources, such as family members, acquaintances, emergency medical personnel, law enforcement officials, and witnesses.

Acute poisoning investigations are used either as preliminary testing or for particular objectives. Screening involves doing a medical assessment and/or diagnostic test on individuals who do not show any symptoms, with the aim of detecting any health issues at an early stage in order to enhance the chances of a positive outcome. Screening tests in critically poisoned patients are designed to detect hidden harmful ingestions that require prompt and targeted treatment[1].

Investigation tests

- 12-lead electrocardiogram.
- U&E (Urea and Electrolytes), laboratory glucose, anion gap ± lactate and osmolal gap.
- LFTs (Liver function tests) and clotting.
- Arterial blood gases.
- Paracetamol level (also salicylates [9], theophylline, digoxin, lithium, antiepileptics - if it was likely that they had been taken).
- Comprehensive toxicology screens not normally indicated in the emergency treatment.
- Carboxyhemoglobin levels if carbon monoxide poisoning is suspected.
- Urinalysis - query rhabdomyolysis; save sample for possible toxicological analysis.
- Chest Radiography if there is suspected pulmonary oedema/aspiration.
- CT scan of the brain may be needed to exclude other causes of alterations in conscious level.

Once initial first-aid procedures have been implemented, it is necessary to develop a strategy for definitive or supportive care. Typically, this entails transporting the patient via ambulance to an emergency center.

Notify the emergency room physician promptly, providing them with comprehensive information and an estimated time of arrival[5].

4. Evacuation:

Following the absorption of a toxic chemical, except for agents that directly harm the gastrointestinal tract (such as iron or corrosives), the substance must be absorbed into the bloodstream and circulated throughout the body before it may reach a specific organ and cause clinical toxicity. Hence, the cornerstone of treatment following toxin consumption is to prevent the absorption of the toxin. Gastrointestinal decontamination (GID) refers to procedures that effectively inhibit the absorption of toxins. Except for infrequent procedures like gastroscopy, GID is typically comprised of three main elements: gastric evacuation, administration of adsorbent, and catharsis.

Gastric evacuation is contraindicated in situations when the airway is unprotected or in cases of caustic chemical or hydrocarbon overdose. Potential complications in this situation include pulmonary aspiration and esophageal perforation. Stomach content retrieval is effective in approximately 30% of cases, especially when done within one hour following ingestion. This treatment is often reserved for patients who rapidly seek medical attention after ingesting a potentially fatal dose of drugs. Controversially, in certain circumstances involving coma or overdose of tricyclics or salicylates, the administration of emesis may be prolonged if there is a suspicion of delayed stomach emptying. Nevertheless, it is crucial to acknowledge that the suggestion for inducing vomiting has been rejected[19].

Various agents have the ability to adsorb hazardous chemicals, hence diminishing their systemic absorption and consequent toxicity. Among these chemicals, activated charcoal is the primary adsorbent, capable of adsorbing nearly all compounds. Catharsis, which used to be a crucial aspect of care, now plays a less significant role in the treatment of poisoned patients[20].

Gastric lavage is used when medications with low absorbability by activated charcoal, such as iron and lithium, have been ingested. It is also used for formulations that release medication slowly over time or for pills that have a special coating to protect them from stomach acid. The process entails placing the patient in a left lateral head-down position at a 20° angle. A wide-bore tube, with a diameter between 36-40F (for children: 16-28F), is then introduced into the stomach. Remove the contents by delivering and inhaling modest quantities (200-300 ml) of warm water or saline solution consecutively (for children: 10-20 ml/kg, preferably saline solution). Alternatively, the stomach contents may be aspirated[4].

Cathartics, a category of substances that have been suggested since ancient times, are used to expel toxins from the digestive system. The two predominant classifications of cathartics are the magnesium salts (such as magnesium citrate and magnesium sulfate) and non-digestible carbohydrates (such as sorbitol). Despite their extensive historical usage, there is almost little empirical data supporting their effectiveness. Conversely, cathartics can cause considerable harm in specific patient populations, especially youngsters and individuals with renal impairment[4].

5. Antidotes:

The utilization of emergency antidotes is becoming more prominent in clinical toxicology due to advancements in the production of sophisticated new antidotes and the evolving range of clinical poisoning cases. Nevertheless, antidotes are effective in only a small proportion of poisonings. For cases of poisoning caused by a recognized chemical, it is advisable to administer an antidote promptly to achieve emergency stabilization, preferably within the initial hour.

Hyperbaric oxygen therapy involves the administration of oxygen at pressures higher than the standard atmospheric pressure, often measured as 1 atmosphere (atm) or 760 mm Hg. The maximum pressure that humans can withstand over a tolerable amount of time is three atmospheres. Hyperbaric units typically do not go beyond 2.5 to 2.8 atmospheres. Hyperbaric oxygenation is increasingly being utilized as a conventional treatment for patients with severe carbon monoxide poisoning. Additionally, it is becoming more accessible for carbon tetrachloride intoxication and perhaps for cyanide and hydrogen sulfide poisoning[1].

Typically, admission to an intensive care unit is recommended after receiving antidotal therapy for the purpose of further monitoring and treatment[21].

6. Elimination:

The emphasis on measures to increase the removal of medications and poisons has been excessive in the past. While it is ideal to quickly eliminate most medicines and poisons, this is often impractical and perhaps dangerous. A comprehensive comprehension of pharmacokinetics, specifically in relation to toxicology (toxicokinetic), is imperative for the proper use of enhanced elimination techniques[18].

Urinary manipulation: refers to the act of intentionally altering or controlling the flow of urine. These approaches necessitate the renal pathway to make a substantial contribution to the overall clearance.

Forced diuresis can raise the rate at which the kidneys filter blood, and manipulating the pH of urine can help remove polar medicines by trapping them.

Alkalinization is frequently employed to treat salicylate overdose, although "forced" diuresis (generating urine volumes of up to 1 L/h) is normally avoided due to the potential for fluid overload[19].

Hemodialysis: A double-lumen catheter is used to extract blood from a major vein, typically the femoral vein, and then it is circulated through the hemodialysis system. To prevent blood clotting in the dialyzer, it is necessary to administer anticoagulant medication to the patient. Drugs and toxins passively diffuse across the semipermeable membrane, moving from an area of higher concentration to an area of lower concentration, and enter a dialysate solution consisting of electrolytes and buffers. Fluid and electrolyte imbalances can be rectified at the same time[9].

Hemoperfusion: is a medical procedure. The blood is circulated through a column containing an adsorbent material, such as charcoal or Amberlite™ resin, using apparatus and vascular access that are similar to those used in hemodialysis. Systemic anticoagulation is necessary,

typically at larger dosages compared to hemodialysis, and thrombocytopenia is a frequent consequence.

The direct interaction between the medication or toxin and the adsorbent material reduces the significance of parameters such as drug size, water solubility, and protein binding. Hemoperfusion generally achieves higher clearance rates compared to hemodialysis for the majority of medications.

Peritoneal dialysis: The process involves introducing dialysate fluid into the peritoneal cavity using a catheter that penetrates the skin, and subsequently removing the fluid. This cycle is then repeated using new dialysate. The gut wall and peritoneal lining function as a selectively permeable barrier. Peritoneal dialysis is a less complex procedure compared to hemodialysis or hemoperfusion and does not necessitate the use of anticoagulation. However, its effectiveness is only around 10-15% due to suboptimal extraction ratios and slower flow rates. Nevertheless, peritoneal dialysis can be conducted in a continuous manner, round the clock, with a dialysate exchange occurring every 1-2 hours. This 24-hour peritoneal dialysis regimen is about equivalent to 4 hours of hemodialysis[19].

PART TWO:
EXPERIMENTAL PART

MATERIALS AND METHODS

1. Type of study:

This is a monocentric descriptive study that employed qualitative and quantitative methods of data collection in the period from 09/01/2024 to 05/02/2024 at Public Hospital Mohamed BOUDIAF in OUARGLA.

2. Study population:

The study involved 69 emergency doctors working at the emergency pavilion at Public Hospital Mohamed BOUDIAF in OUARGLA including general physicians and interns and specialist physicians.

3. Subject's inclusion and exclusion criteria:

3.1. Inclusion criteria:

- Emergency doctors working in Public Hospital Mohamed BOUDIAF at OUARGLA
- They were either enrolled, registered as physicians in medical care
- They were deployed in emergency pavilion during the time of study.
- They were directly involved in patient care management.
- They gave a consent to participate.
- Intern doctors in emergency department placement doing internship trainings.

3.2. Exclusion criteria

- Doctors who were on study leave, maternity leave, and annual leave during time of study.
- All emergency doctors who declined to participate in the study.
- Emergency doctors who were not involved directly in immediate patient management like those permanently deployed in radiology, laboratories, etc.

4. Data collection:

A self-administered structured questionnaire was used to collect the data

5. Data collection methods:

Structure of the questionnaire comprised five sections as indicated in Table D.1.

Table D.1. Distribution of the questionnaire

Section	No of items	Aspect to be covered
A	7	Social and demographic data
B	9	Knowledge of acute poisoning
C	7	Initial care of acute intoxication
D	10	Perception of patients with acute intoxication

6. Data analysis:

Data were entered and analyzed in Excel Microsoft 2019.

Statistical measures of mean and standard deviation were used as continuous variable.

7. Data presentation:

Data were presented as frequency tables, bar graphs and figures.

Inferential statistics were presented in relation to their level of significance.

8. Ethical statement:

No clinical experiment was conducted on humans in this study.

All emergency physicians were informed in advance that participation in the study was voluntary and the identities of those who participated were withheld throughout the study. Purpose of the study was explained to them, and those who were willing to participate provided a verbal consent in advance.

RESULTS

1. Social and demographic data:

1.1. Repartition of population by age:

Figure E.1. present the distribution of the population by age. The mean (26.8) and standard deviation (3.4) with minimum (23) and maximum (37)

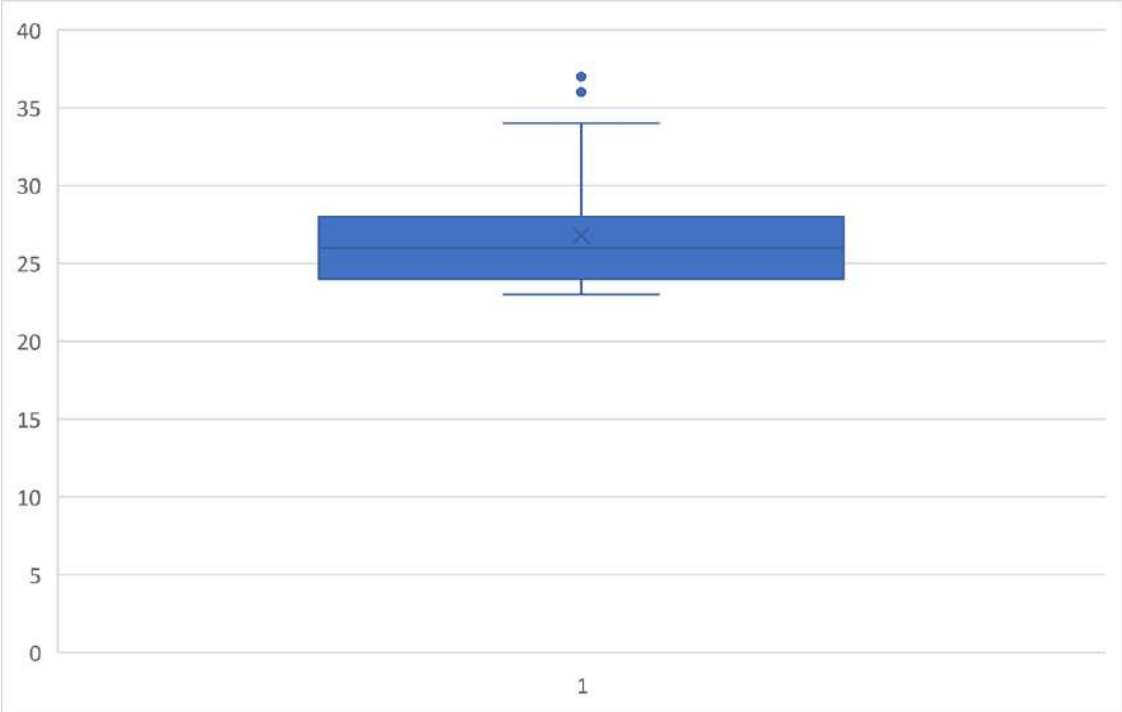

Figure E.1. Repartition of population by age

1.2. Repartition of population by gender:

As presented in Figure E.2. The majority of population was female (n=48, 69.6%)

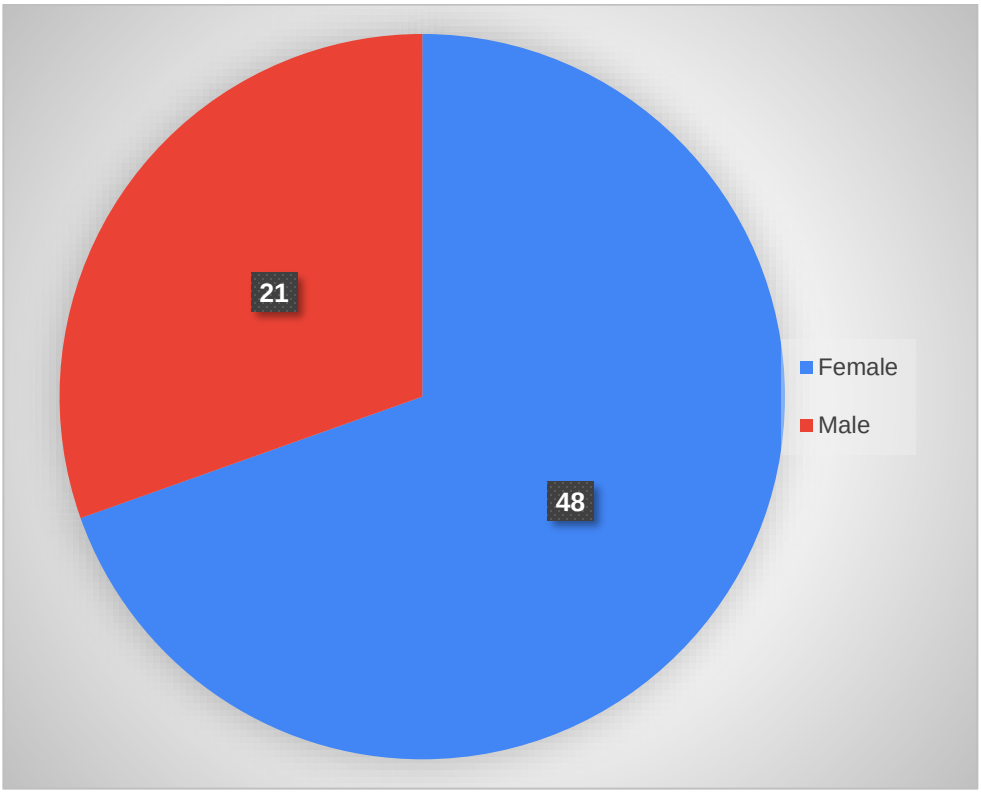

Figure E.2. Repartition of population by gender

1.3. Repartition by marital status:

Most of the population is single as presented in Figure E.3.; as in 79.1% (n=55) are single.

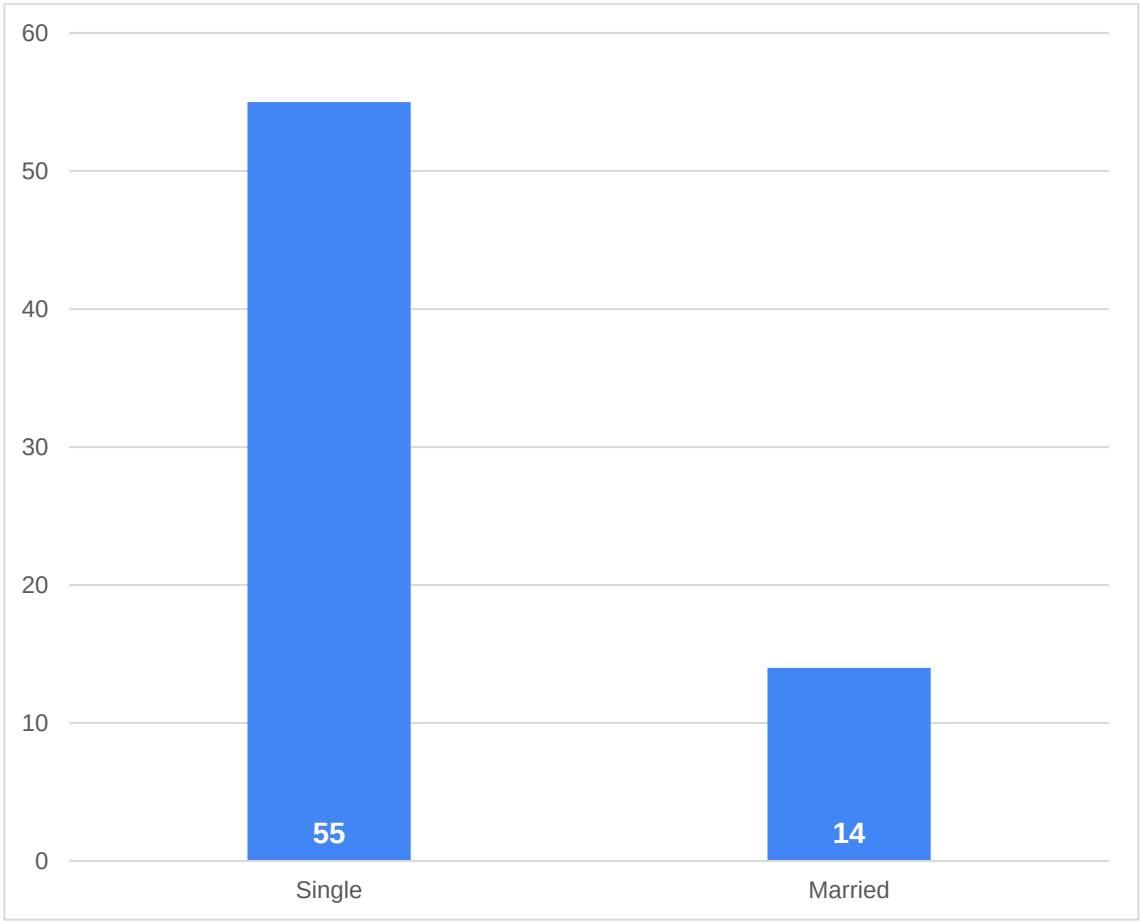

Figure E.3. Repartition of population by marital status

1.4. Repartition by profession:

Nature of profession were mostly between interns and general practitioner, while only few were specialist physicians. As mentioned in Figure E.4.

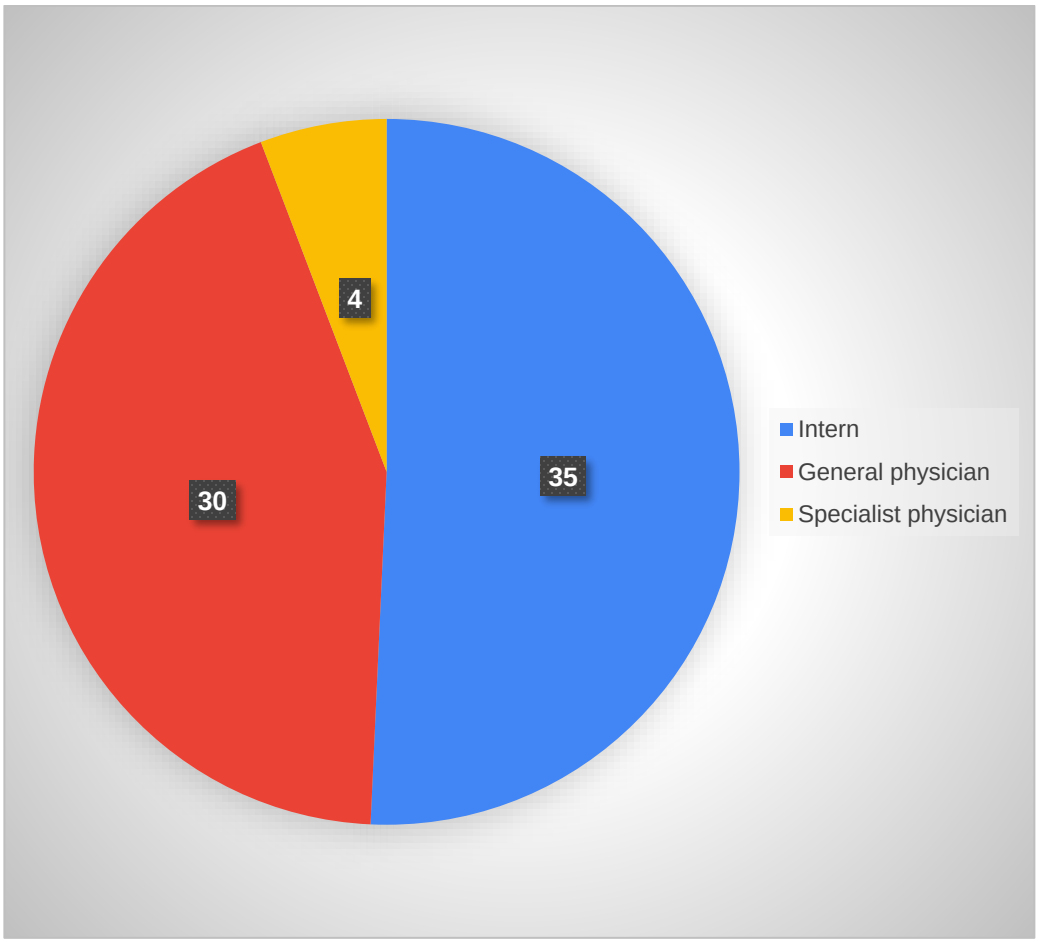

Figure E.4. Repartition of population by profession

1.5. Repartition by current department:

Most of practitioners were divided between different departments of emergencies as in medical and surgical and pediatric pavilion.

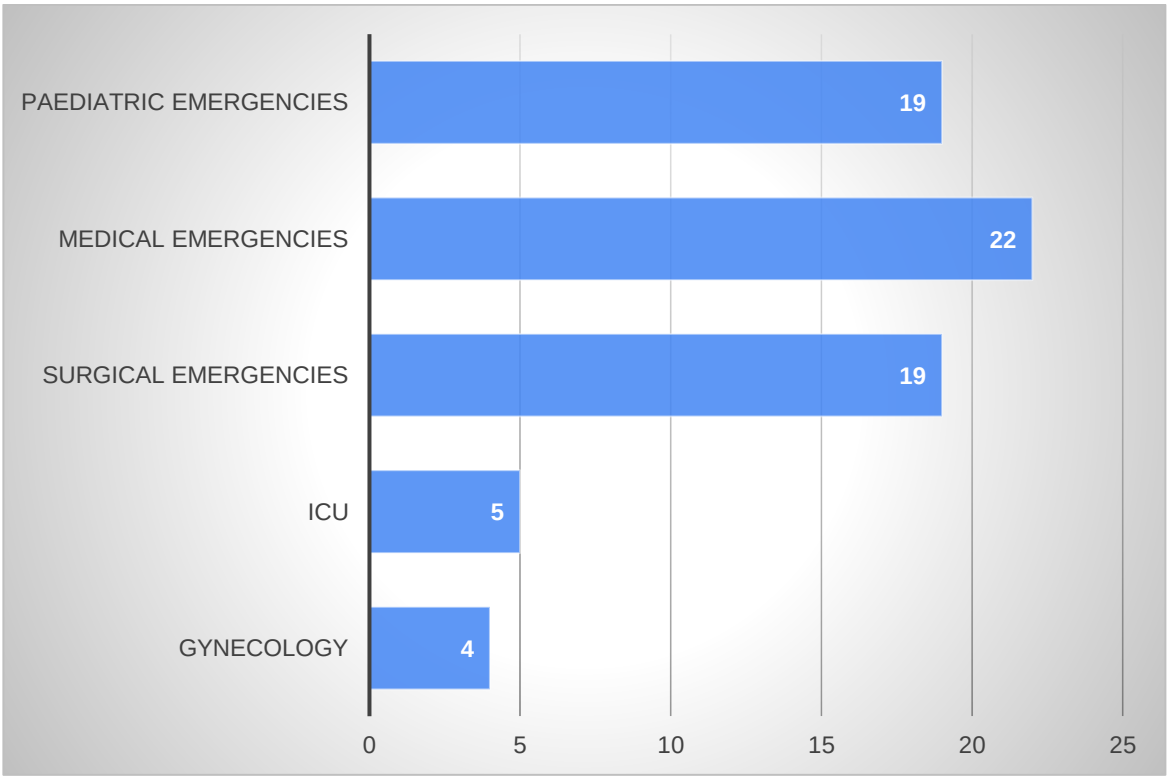

Fig E.5. Repartition of population by department

1.6. Experience length:

In Figure E.6., the mean of experience length of population is (9,2), standard deviation (11,2), min (1) and max (60).

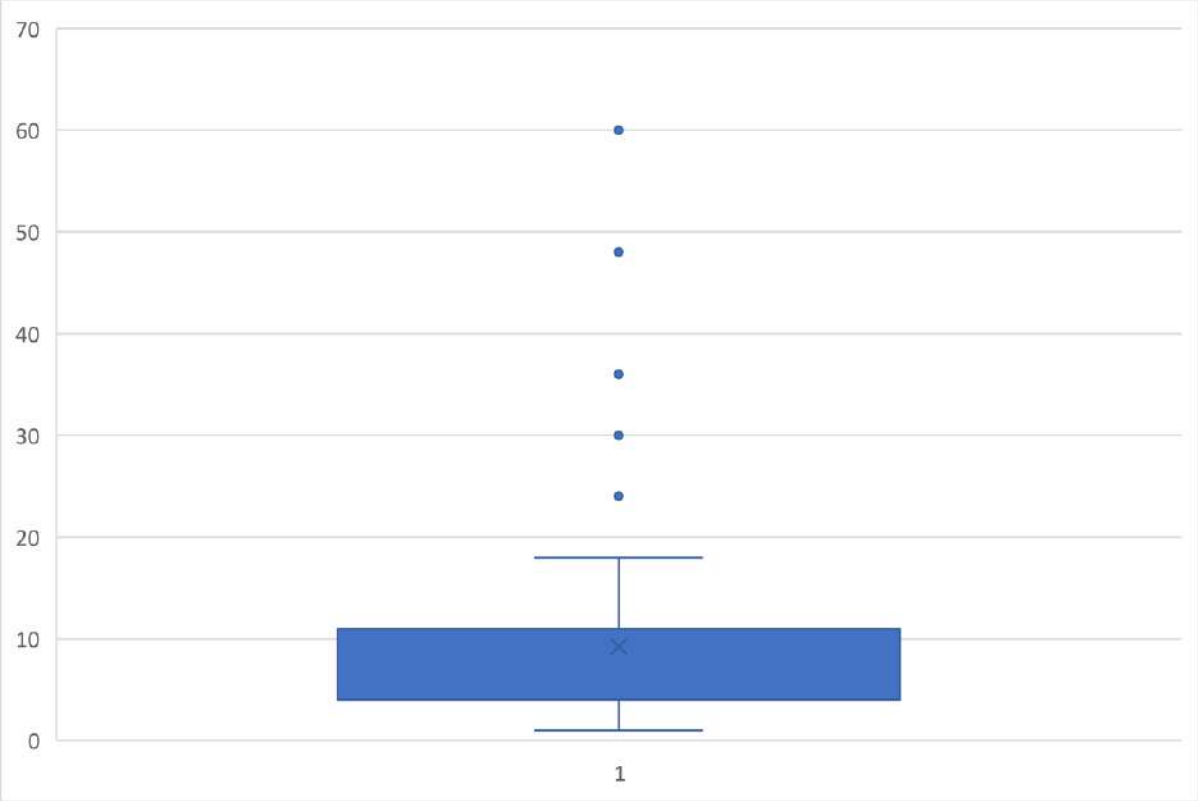

Figure E.6. Repartition of population by experience length

1.7. Repartition by training in acute poisoning management:

More than two-thirds (66.7%) of the population haven't had any training in subject of acute poisoning management as presented in Figure E.7.

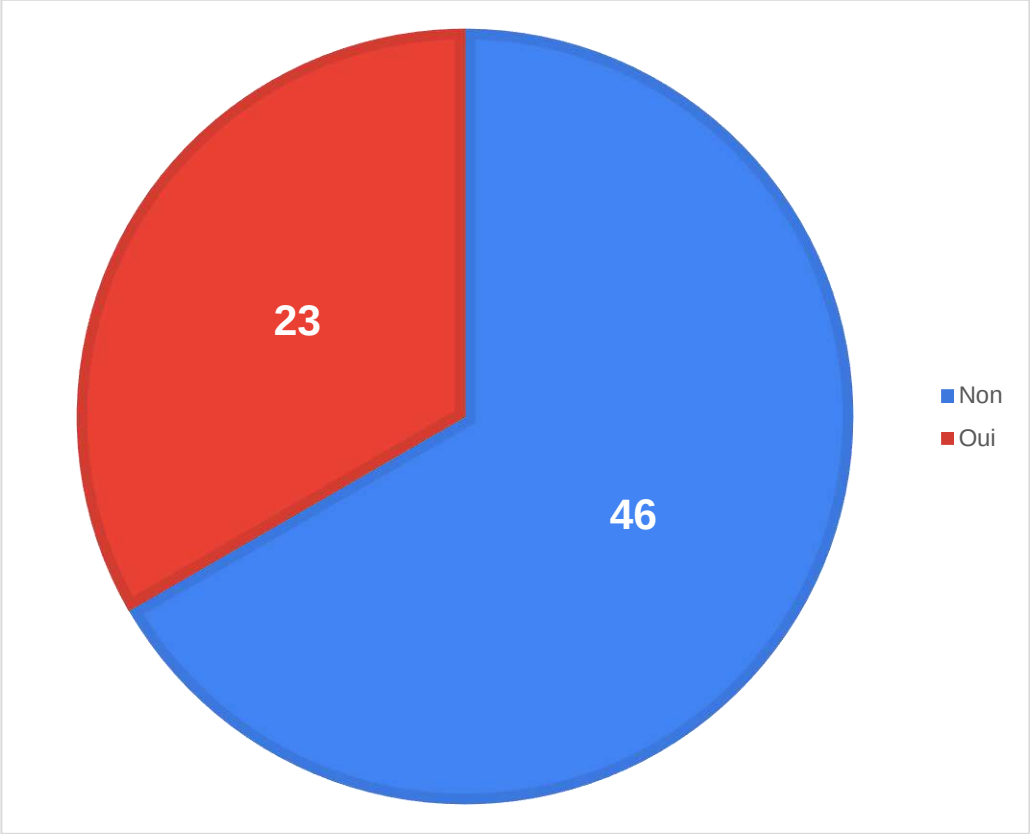

Figure E.7. Repartition of population by training in acute poisoning management

2. General knowledge of acute poisoning:

The general knowledge of emergency doctors on poisonings assessed using the 21 items. The item for which doctors displayed the lowest knowledge level was the frequent causes of acute poisoning that are presented in emergency pavilion. Only 32 (46.4%) of the doctors were aware that poisoning can be classified as non-accidental and suicidal. Another question that was poorly scored was the alimentary signs and symptoms of acute poisoning during early stages, most doctors could not differentiate signs affecting gastrointestinal system and those affecting other body systems.

Table E.2.1. Doctors' responses to items on general knowledge on poisoning

General knowledge of acute poisoning	Correct (%)	Incorrect (%)
A toxic substance is any substance capable of causing damage or malfunction in the body through its chemical activity (T)	68 (98.6%)	1 (1.4%)
The ingested dose and time of ingestion are not very necessary considerations when treating an adult poisoned patient (F)	64 (92.8%)	5 (7.2%)
As an emergency doctor, it is always important to treat the poison and not the patient (F)	63 (91.3%)	6 (8.7%)
In your opinion, what are the basic criteria for assessing the severity of the poisoning:		
• Clinical symptoms (T)	67 (97.1%)	2 (2.9%)
• The age of the patient (T)	48 (69.6%)	21 (30.4%)
• Quantity of poison administered (T)	64 (92.8%)	5 (7.2%)
• Period of exposure to poison (T)	55 (79.7%)	14 (20.3%)
• Admission time to the emergency pavilion (T)	56 (81.2%)	13 (18.8%)

Intoxication cases in adolescents are usually non-accidental (T)	53 (76.8%)	16 (23.2%)
Carbon monoxide intoxication is the most common cause of poisoning in developing countries (T)	54 (78.3%)	15 (21.7%)
For the general population, women are more likely to take a toxic substance to commit suicide than men (T)	62 (89,9%)	7 (10,1%)
In your opinion, the frequent causes of acute intoxication among patients presenting themselves at the level of the emergency pavilion, depending on the pattern and the nature of its use, can be:		
• Accidental (T)	66 (95.7%)	3 (4.3%)
• Suicide (T)	32 (46.4%)	37 (53.6%)
• Murder (F)	55 (79.7%)	14 (20.3%)
• Non-accidental (T)	32 (46.4%)	37 (53.6%)
• Other (F)	57 (82.6%)	12 (17.4%)
Clinical signs of acute intoxication in the early stages include		
• Nausea and vomiting (T)	62 (89.9%)	7 (10.1%)
• Diarrhea and abdominal pain (T)	55 (79.7%)	14 (20.3%)
• Dyspnea, cyanosis, hyperventilation and salivation (T)	47 (68.1%)	22 (31.9%)
• Altered state of consciousness, hallucination and ataxia (T)	51 (73.9%)	18 (26.1%)
• Dermatological lesions (F)	53 (76.8%)	16 (23.2%)

- **Overall knowledge of emergency physicians on acute poisoning:**

Based on responses to the 21 general knowledge items, a score (range 0 to 21) was calculated for each nurse. The mean score out of 21 for the entire sample was 16 with SD of 1.9 and a range of 11 to 19.

Table E.2.2. compares the mean general knowledge score for doctors according to gender, age, doctors formal training on acute poisoning and length of experience. Doctors older than 35 years scored the highest mean (17).

The rest means in each category are similar, with slight difference in range in advanced ages and length of experience with a min 16 in advanced categories.

Table E.2.2. Emergency physicians' gender, age, formal training on acute poisoning and length of experience versus general knowledge on acute poisoning practices

	Number (n)	Mean (SD)	Range	Chi² test
Gender				
Male	**21**	**16 (1.7)**	**13-19**	$X^2(2, N=69) = 0.277$ P = 0.871
Female	**48**	**16 (2.0)**	**11-19**	
Age				
23-29 years	**52**	**16 (2.0)**	**11-19**	$X^2(4, N=69) = 7.330$ P = 0.119
30-35 years	**13**	**16 (1.9)**	**12-18**	
36 years and above	**4**	**17 (1.2)**	**16-18**	
Formal training on acute poisoning				
Yes	**23**	**16 (1.7)**	**13-19**	$X^2(2, N=69) = 1.500$ P = 0.472
No	**46**	**16 (2.0)**	**11-19**	

Length of experience				
0-6 months	**49**	**16 (2.0)**	**11-19**	$X^2(4, N=69) = 3.094$ $P = 0.542$
7-24 months	**15**	**16 (1.9)**	**13-19**	
25 months and above	**5**	**16 (0.9)**	**16-18**	

3. Initial management of acute poisoning:

Out of the 69 doctors included in the study, 5 (7.2%) gave the correct response to all the seven questions on initial management of acute poisoning practices. The area in which doctors displayed the least knowledge was the indication of gastro-intestinal decontamination for corrosive substance ingestion with 33 (47.8%) of doctors recognizing that these patients may benefit from the decontamination within the first hours of presentation. Conversely, 68 (98.6%) of nurses rightly identified that the priority in managing severe acute poisoning is maintaining adequate airway, breathing and circulation.

Table E.3.1. Emergency doctors' responses to items on initial management of poisoning

Initial management of acute poisoning	Correct (%)	Incorrect (%)
In case of severe acute intoxication, maintaining adequate breathing and circulation is always a priority (T)	68 (98.6)	1 (1.4)
Almost every poisoning in the emergency pavilion has its own specific antidote (F)	39 (56.5)	30 (43.5)
The decision to perform gastrointestinal decontamination should be based on the specific poison ingested, the time between ingestion and presentation, and the presented and expected severity of the poisoning (T)	67 (97.1)	2 (2.9)
Provoked vomiting is indicated in a conscious patient who has ingested a substantial amount of a toxic substance within 60 minutes of presentation (F)	53 (76.8)	16 (23.2)
Gastric decontamination is indicated in patients who have ingested a corrosive substance within an hour of presentation (T)	33 (47.8)	36 (52.2)
The effectiveness of gastric decontamination increases as the time between ingestion and treatment increases (F)	58 (84.1)	11 (15.9)
Patients presented for ingestion of controlled-release preparations may benefit from decontamination even after a longer delay (for example more than 04 hours) (T)	48 (69.6)	21 (30.4)

- **Overall initial management of acute poisoning:**

Based on the responses to the 7 items on initial management of acute poisoning, a score (range 0-7) was calculated for each physician. The mean score for all physicians in the study was 5 (SD 0.9), range 3 to7.

Table 2.2. below summarizes the knowledge of physicians on the initial management of acute poisoning according to gender, age, formal trainings on acute poisoning and length of experience in emergencies.

Table E.3.2. Emergency physicians' gender, age, formal training on acute poisoning and length of experience versus knowledge on initial management of acute poisoning practices.

	Number (n)	Mean (SD)	Range	Chi² test
Gender				
Male	**21**	**5 (0.9)**	**3-7**	$X^2(2, N=69) = 0.233$ P = 0.890
Female	**48**	**5 (0.8)**	**4-7**	
Age				
23-29 years	**52**	**5 (0.9)**	**3-7**	$X^2(4, N=69) = 58.031$ P = 0.000
30-35 years	**13**	**5 (0.7)**	**4-6**	
36 years and above	**4**	**5 (0.0)**	**5-5**	
Formal training on acute poisoning				
Yes	**23**	**5 (0.9)**	**3-7**	$X^2(2, N=69) = 6.933$ P = 0.031
No	**46**	**5 (0.9)**	**4-7**	
Length of experience				
0-6 months	**49**	**5 (0.9)**	**3-7**	$X^2(4, N=69) = 18.632$ P = 0.001
7-24 months	**15**	**6 (0.6)**	**5-7**	
25 months and above	**5**	**5 (0.5)**	**5-6**	

The highest mean 6 (SD 0.6) scored by doctors with experience period between 7 and 24 months.

Rest of mean scores are similar and ranges slightly varies.

4. Perception towards patients with acute intoxication:

The responses to 10 items on perception of doctors towards patients presenting with acute poisoning were obtained on a five-point Likert scale presented in Table 3 below. The item with the highest rate of strong agreement among nurses (45.6%) was that a person who has made numerous suicide attempts by taking poison is at high risk of succeeding in the future and needs help and understanding. On the other hand, the item that most doctors (30.9%) disagreed with strongly was that once a person takes poison, he is suicidal forever and staff can do nothing about it.

Table E.4.1. emergency doctors' perceptions towards patients presenting with acute poisoning

Perception towards patients with acute intoxication	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Patients with intoxications occupy more staff time, so staff is not available for patients who need more help	17 (25%)	22 (32.4%)	21 (30.9%)	7 (10.3%)	1 (1.5%)
Sometimes I get nervous and uncomfortable when I need to take care of a poisoned patient, especially those who have been deliberately poisoned	9 (13.2%)	24 (35.3%)	12 (17.6%)	17 (25%)	6 (8.8%)
A person who has made many suicide attempts by taking poison is at high risk of success in the future and needs help and understanding	31 (45.6%)	28 (41.2%)	5 (7.4%)	4 (5.9%)	0 (0.0%)
It is frustrating to treat patients who have taken poison every time they are presented as victims	8 (11.8%)	24 (35.3%)	14 (20.6%)	18 (26.5%)	4 (5.9%)
Patients who are deliberately poisoned and hospitalized will make attempts in the future, regardless of the support provided by health professionals	12 (17.6%)	7 (10.3%)	20 (29.4%)	24 (35.3%)	5 (7.4%)

The empathy demonstrated by the healthcare professional can positively influence patients who have deliberately taken poison to reconsider a future poison attempt	18 (26.5%)	27 (39.7%)	21 (30.9%)	2 (2.9%)	0.0
Poisoned patients are not responsible for their actions but are victims of their environment and need maximum understanding and care	6 (8.8%)	10 (14.7%)	15 (22.1%)	24 (35.3%)	13 (19.1%)
Honestly, I prefer not to get involved with patients who have taken any form of poisoning, whatever the intention and cause	21 (30.9%)	12 (17.6%)	19 (27.9%)	10 (14.7%)	6 (8.8%)
Doctors consider it less important to treat self-intoxicating patients than accidentally intoxicated patients to whom they can pay more attention	2 (2.9%)	9 (13.2%)	17 (25%)	19 (27.9%)	21 (30.9%)
Once a person takes poison, he will do it every time, medical staff can't do anything about it	4 (5.9%)	12 (17.6%)	7 (10.3%)	24 (35.3%)	21 (30.9%)

- **Overall attitude of emergency doctors towards poisoned patients:**

On a scale ranging from 0 to 10 with higher scores representing positive attitude the physicians in this sample scored a mean of 5 (SD 1.7) representing a generally positive attitude on management of acute poisoning. The comparison of attitude scores among doctors according to their emergency experience, age group, gender and attendance of formal training on management of acute poisoning is presented in Table 3.2. below.

Table E.4.2. Length of experience, formal training on poisoning management, age group and gender versus attitude of emergency doctors towards poisoned patients.

	Number (n)	Mean (SD)	Range	Chi^2 test
Gender				
Male	**21**	**5 (1.9)**	**0-8**	$X^2(2, N=69) = 0.513$ P = 0.774
Female	**48**	**5 (1.6)**	**0-8**	
Age				
23-29 years	**52**	**5 (1.8)**	**0-8**	$X^2(4, N=69) = 45.115$ P = 0.000
30-35 years	**13**	**6 (1.3)**	**4-8**	
36 years and above	**4**	**6 (0.6)**	**5-6**	
Formal training on acute poisoning				
Yes	**23**	**5 (1.7)**	**0-8**	$X^2(2, N=69) = 11.631$ P = 0.003
No	**46**	**5 (1.7)**	**0-8**	
Length of experience				
0-6 months	**49**	**5 (1.8)**	**0-8**	$X^2(4, N=69) = 24.071$ P = 0.000
7-24 months	**15**	**6 (1.2)**	**4-8**	
25 months and above	**5**	**5 (1.5)**	**4-8**	

DISCUSSION

1. Introduction:

Toxicosis is a significant global health concern. Acute poisoning leads to an increase in both hospitalizations and emergency cases. It is responsible for around 3 million cases of sickness worldwide. Acute poisoning is a critical medical emergency. In order to effectively manage such circumstances, it is imperative that all team members possess adequate knowledge, expertise and skills, as teamwork is essential. Doctors have a crucial role in situations of acute poisoning. The lack of doctors' understanding may be the underlying factor contributing to medication errors.

So, the aim of this study was to determine doctors' knowledge, attitude and practice on the initial management of acute poisoning among casualties seen at Public Hospital Mohamed BOUDIAF at Ouargla.

2. Characteristics of the participating physicians:

According to this study, most of the doctors (75.4%) were in the age group of 23-29 years with a mean age of 26.8 ± 3.4 years.

Regarding to their education level, most of doctors (50.7%) were interns in the last year of medical studies. The main cause of that might be that the study was conducted in a facility of university hospital center, which explains also why most of the participant doctors (71%) had an experience varies between 1 and 6 months with a mean 9.2 ± 11.2 months.

However, according to the results there was a lack of trained and formed doctors on acute poisoning with only third (33.3%) of all participants had a formal training or formation on acute poisoning.

3. Knowledge, practice and attitude of physicians towards acute poisoning:

3.1. Knowledge level on acute poisoning:

Most of participant doctors (53.6%) had an acceptable level (15-17 correct answers out of 21 questions) and (29%) had a good level (18 correct answers and above out of 21 questions) of

general knowledge on acute poisoning, contrary the findings reported in previous studies done in India [22] and Ethiopia [2]. The area in which doctors displayed the least general knowledge level was the frequent causes of acute poisoning that are presented in emergency department. Otherwise, the item where the highest general knowledge level was displayed is the definition of a toxic substance. The item of basic criteria for assessing the severity of the acute intoxications showed the most acceptable combination of convenient knowledge level on acute poisoning.

This might be because the majority of the participants were interns and freshly graduated from medical college which will lead to the recent and fresh informations they acquired during their few last years of study.

However; (17.4%) of the participants had an unsatisfactory level (less than 14 correct answers out of 21 questions) of general knowledge on acute poisoning, which might be the cause of absence in training and formation conducted on the subject of acute poisoning.

3.2. Level of practice and knowledge on initial management of acute poisoning:

Regarding the initial management of acutely poisoned patients, the majority of the physicians (78.3%) had an acceptable level (5-6 correct answers out of 7 questions) and (14.5%) had an insufficient level (less than 4 correct answers out of 7 questions) of knowledge regarding the initial management on acute poisoning. Whereas, the percentage of physicians who had a good level (7 correct answers out of 7 questions) of knowledge and practice on early care of acute poisoning was just (7.2%).

This variance in the degree of knowledge could be due to the fact that different doctors have either different levels of experience or different levels of training. The outcomes of our study lend credence to this evidence, as just 33.3% of the physicians have received training, and only 29% have worked in emergencies for more than 6 months. Similar results was found in a cross sectional study conducted on nurses in Ethiopia’s hospitals [2].

The indication of gastro-intestinal decontamination for corrosive substance ingestion displayed the least level (47.8%) on practice knowledge of initial management of acute poisoning.

Whereas, the priority in managing acutely intoxicated patients scored the highest level (98.6%) on practice knowledge of initial management of acute poisoning.

A considerable disagreement was demonstrated in the item which includes that each poisoning has its own specific antidote as (56.5%) for correct statements that replied with negation on this item while (43.5%) replied positively as incorrect statements.

3.3. Attitude towards poisoned patients:

In the context of perception of the attitude displayed by the participant doctors, only 16 (23.2%) out of the 69 participants had an insufficient positive attitude towards acutely poisoned patients admitted to the emergency department. While (56.5%) demonstrated a considerable accepted positive attitude. However, only (20.3%) were happy to take care of poisoned patients and they feel sympathy as they care for other patients.

The results of our study conveniently differs of other studies such as one conducted in Glascow [23] on medical staff and another conducted in Greece [24] on doctors' attitude towards attempted suicide.

4. Association of physicians' characteristics to their practice and attitude with acute poisoning:

In order to investigate the association between dependent and independent variables, Chi square tests (for both bivariate and multivariate analysis) was conducted in this study with a 5% as significance level of difference.

According to the results of the data analysis displayed previously in the general knowledge on acute poisoning section, the relation between these variables and the knowledge level is statistically not significant. Thus, this data analysis results demonstrate that none of the variables is determinately associated with the general knowledge of participant physicians about acute poisoning.

Otherwise, in the practice and knowledge of initial management of acute poisoning section the data analysis displayed results, the significance in differences concern the age, the training n acute poisoning and the length of experience in emergency department while the gender results were not statically significant. Conveniently, this data analysis displays the age, formal training on acute poisoning management and length of experience are significantly related to the mount of knowledge and practice sufficiency in the initial management of acutely intoxicated patients admitted to the emergency room.

5. Forces and limitations in the study:

5.1. Forces:

The originality of this study lies in its status as the first of its kind to address the issue of state of knowledge of emergency doctors on the management of acute poisoning in the Public Hospital Mohammed Boudiaf in Ouargla.

5.2. Limitations:

A majority of the participating physicians were interns.

Survey response rate very low and not accurate, that's due to the lack of free time and the heavy duty on emergency physicians.

Most of participants were younger and had an access to online resources which might resulted a bias in this study.

According to the sample size and characteristics, the global general informations about physicians in the Public Hospital Mohammed Boudiaf in Ouargla might not have been captured.

6. Implications of the study:

This study aims to provide policymakers, the ministry of health, and health facility administrators with a comprehension of the existing knowledge and attitude of physicians on the initial management of acute poisoning. Therefore, the findings of this research can serve as a starting point for creating approaches to enhance the understanding and mindset of medical

practitioners in the treatment of acute poisoning. Additionally, it can serve as the foundational data for other researchers seeking to do a literature review or write an original paper.

7. Recommendations and perspectives:

Emergency physicians should get comprehensive training on the identification, evaluation, and treatment of different forms of poisoning, including the assessment of symptoms, their clinical manifestations, and appropriate management strategies. Furthermore, it is necessary to do refresher courses to sustain the beneficial improvements with regard to the physicians' confidence and knowledge.

It is recommended to establish and apply flowcharts that will improve the ability to easily identify and manage admitted individuals to the emergency room who have been poisoned.

While the overall opinions of emergency physicians were good, it is necessary to further investigate the variations and contrasts among certain variables.

CONCLUSION

Conclusion:

Emergency physicians serve as the initial point of contact for individuals affected by acute poisoning, as well as their relatives. This study presents an analysis of the educational background, the level of experience, and training status of the physicians employed at the Public Hospital Mohammed Boudiaf in Ouargla.

The study found that the social and demographic characteristics of emergency physicians, such as their level of education, age, length of experience in emergency medical care, and training courses, had different impacts on the first management of acute poisoning. Increased education, firsthand experience with emergencies, and training in critical care courses improved doctors' awareness and competence in managing poisonings in the initial phases.

Age, experience, and training demonstrate a more solid correlation with management skills. Therefore, medical institutions should regularly organize training programs to develop the skills of medical professionals. It is well acknowledged that experience holds great significance in the medical profession. Acquiring knowledge can be achieved by self-study using books or by attending training sessions. However, skills can only be honed through practical experience, which is crucial while dealing with a poisoned patient or any other emergency situation.

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ANNEXES

Annexes:

Evaluation sur la connaissance des médecins d'urgence sur la prise en charge des intoxications aiguës

Données sociales et démographiques

1. **Age :** .....
2. **Sexe :**
   - ☐ Homme
   - ☐ Femme
3. **Statut martial**
   - ☐ Célibataire
   - ☐ Marié(e)
   - ☐ Divorcé(e)
4. **Vous êtes :**
   - ☐ Médecin généraliste
   - ☐ Interne
   - ☐ Médecin spécialiste
5. **Quel est votre service actuel :** .....
6. **Durée d'expérience (par mois) :** .....
7. **Avez-vous reçu une formation dans la gestion des intoxications aiguës depuis que vous avez commencé à travailler aux urgences**
   - ☐ Oui
   - ☐ Non

Connaissances sur les intoxications aiguës

8. **Le poison est toute substance capable de causer des dommages ou des dysfonctionnements dans le corps par son activité chimique**
   - ☐ Oui
   - ☐ Non
9. **La dose ingérée et le temps d'ingestion ne sont pas des considérations très nécessaires lors de la gestion d'un patient adulte empoisonné**
   - ☐ Oui
   - ☐ Non
10. **En tant que médecin d'urgence, il est toujours important de traiter le poison et non le patient**
    - ☐ Oui
    - ☐ Non

11. **D'après vous, quels sont les critères fondamentaux pour évaluer la gravité de l'intoxication**
    - ☐ Les symptômes cliniques
    - ☐ L'âge du patient
    - ☐ Quantité de poison administrée
    - ☐ Période d'exposition au poison
    - ☐ Temps d'admission au pavillon d'urgence

12. **Les cas d'intoxication chez les adolescents sont généralement**
    - ☐ Accidentelle
    - ☐ Non-accidentelle

13. **L'intoxication au monoxyde de carbone est la cause la plus fréquente d'empoisonnement dans les pays en développement**
    - ☐ Oui
    - ☐ Non

14. **Les femmes sont plus susceptibles de prendre du poison dans la population générale pour se suicider que les hommes**
    - ☐ Oui
    - ☐ Non

15. **D'après vous, Les causes de l'intoxication aigue parmi les victimes qui présentent au niveau du pavillon d'urgence, en fonction du motif et de la nature de son utilisation, peuvent être**
    - ☐ Accidentelle
    - ☐ Suicidaire
    - ☐ Homicide
    - ☐ Non accidentelle
    - ☐ Autre

16. **Les signes cliniques d'une intoxication aiguë pendant les premiers stades comprennent**
    - ☐ Nausées et vomissements
    - ☐ Diarrhée et douleurs abdominales
    - ☐ Dyspnée, cyanose, hyperventilation et salivation
    - ☐ Altération d'état de conscience, hallucination et ataxie
    - ☐ Lésions dermatologiques

Prise en charge initial de l'intoxication aigue

17. **En cas d'intoxication aiguë sévère, le maintien d'une respiration adéquate et de la circulation est toujours une priorité**
    - ☐ Oui
    - ☐ Non

18. **Presque toutes les intoxications rencontrées dans le pavillon d'urgence ont leur antidote spécifique**
    - ☐ Oui
    - ☐ Non

19. La décision d'effectuer la décontamination gastro-intestinale doit être basée sur le poison spécifique ingéré, le temps entre l'ingestion et la présentation, et la gravité présentée et prévue de l'intoxication
    - ☐ Oui
    - ☐ Non
20. Le vomissement provoqué est indiqué chez un patient conscient qui a ingéré une quantité substantielle d'une substance toxique dans les 60 minutes suivant la présentation
    - ☐ Oui
    - ☐ Non
21. Le lavage gastrique est indiqué chez les patients qui ont ingéré une substance corrosive dans l'heure suivant la présentation
    - ☐ Oui
    - ☐ Non
22. L'efficacité du lavage gastrique augmente à mesure que le temps entre l'ingestion et le traitement augmente
    - ☐ Oui
    - ☐ Non
23. Les patients présentent pour ingestion des préparations à libération contrôlée peuvent bénéficier de la décontamination même après un retard plus long (par exemple plus de 04 heures)
    - ☐ Oui
    - ☐ Non

Perception vis-à-vis des patients présentant une intoxication aiguë

24. Les patients présentant une intoxication occupent plus de temps de personnel, de sorte que le personnel n'est pas disponible pour les patients qui ont plus besoin d'aide
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
25. Parfois, je suis devenu nerveux et mal à l'aise quand j'ai besoin de prendre soin d'un patient empoisonné, surtout ceux qui ont été empoisonnés délibérément
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
26. Une personne qui a fait de nombreuses tentatives de suicide en prenant du poison est à risque élevé de réussir à l'avenir et a besoin d'aide et de compréhension
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait

27. Il est frustrant de traiter des patients qui ont pris du poison chaque fois qu'ils se présentent en victime
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
28. Les patients empoisonnés intentionnellement hospitalisés feront des tentatives à l'avenir, peu importe le soutien que les professionnels de la santé leur apportent.
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
29. L'empathie démontrée par le professionnel de la santé peut influencer positivement les patients qui ont délibérément pris du poison pour reconsidérer une tentative future de poison
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
30. Les patients empoisonnés ne sont pas responsables de leurs actions mais sont victimes de leur environnement et ont besoin de compréhension et de soins maximaux
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
31. Honnêtement, je préfère ne pas m'impliquer avec des patients qui ont pris une forme quelconque d'empoisonnement, quelle que soit l'intention et la cause
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
32. Les médecins considèrent qu'il est moins important de traiter les patients auto-intoxiqués que les patients accidentellement intoxiqués auxquels ils peuvent accorder plus d'attention
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait
33. Une fois qu'une personne prend du poison, elle se suicide pour toujours. Le personnel médical ne peut rien y faire
    - ☐ Très satisfait
    - ☐ Satisfait
    - ☐ Neutre
    - ☐ Insatisfait
    - ☐ Très insatisfait

BOUROUBA Mouad

Knowledge status of emergency physicians on the initial management of acute poisoning in Public Hospital Mohamed Boudiaf Ouargla

Thesis submitted to obtain a doctorate degree in medicine

ABSTRACT

Introduction: Acute poisoning is a critical medical situation that necessitates immediate transportation of patients to the hospital, regardless of the quantity or type of toxin involved. Early management decisions are necessary to achieve the optimal possible outcome for the patient. **Materials and methods:** This is a monocentric descriptive study that employed qualitative and quantitative methods of data collection in the period from 09/01/2024 to 05/02/2024 at Public Hospital Mohamed BOUDIAF in OUARGLA. The main objective of which is to assess the knowledge, attitude, and practice of emergency physicians toward the initial management of acute poisoning. Sample size comprised of all emergency physicians who met subject's inclusion criteria. Structured questionnaire was used to collect the data. Data were entered and analyzed in the statistical program SPSS version 25. **Results:** Sixty-nine emergency doctors participated in the study. Only (17.4%) of the participant doctors had an unsatisfactory level of general knowledge about acute poisoning. Likewise, only (14.5%) had an insufficient level of knowledge in the initial management on acute poisoning. The study found out that with higher education level and training on courses related to emergency care, knowledge and skills of emergency physicians on the initial management of acute poisoning increased. Emergency physicians in advanced age (above 30 years) had a higher mean score (6 ± 0.95) of positive attitude compared with those physicians with younger age. **Conclusion:** Emergency physicians should be trained in poisoning evaluation, clinical presentation, and management. Additionally, refresher training should be offered for those already trained. It is recommended that the emergency department establish and use flowcharts to facilitate the identification and management of poisoned casualties.

Key words: acute poisoning, knowledge, attitude, initial management.

Supervisor: Pr KERDOUN Mohamed Amine

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