



Center for Innovative Drug Development and Therapeutic Trials for Africa

Preparedness and Experience of healthcare professionals in managing acute poisoning and its associated factors at Kidus Petros Hospital, Addis Ababa, Ethiopia – a facility based cross-sectional study

A Thesis Submitted to CDT- Africa, College of Health Sciences, Addis Ababa University for partial fulfilment of requirement for MSc program in clinical trial

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This is to certify that the thesis prepared by Hana Mulat entitled: Preparedness and Experience of healthcare professionals in managing acute poisoning and its associated factors at Kidus Petros Hospital, Addis Ababa, Ethiopia – a facility based cross-sectional study and submitted in partial fulfilment of the requirements for the MSc program in clinical trials compiles with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Contents

Abstract	4
Acknowledgement	5
Abbreviations/Acronyms.....	6
1. Introduction	7
1.1. Background Information	7
1.2. Significance of the Study	9
1.3. The Rationale behind Selecting Kidus Petros Hospital	9
1.4. Problem Statement.....	9
2. Literature review	10
2.1. Knowledge and Practice gap in Ethiopia and other LMICs	10
2.2. Factors associated with knowledge and practice	11
2.2.1. In-service training	11
2.2.2. Service Unit	12
2.2.3. Educational Level and work experience.....	12
2.2.4. Gender	12
2.2.5. Availability of resources and standard treatment protocol	12
2.2.6. Workload.....	12
2.3. Conceptual Framework.....	12
3. Objectives.....	13
3.1. General Objective	13
3.2. Specific Objectives	13
4. Methods.....	13
4.1. Study setting.....	13
4.3. Study Design.....	14
4.4. Target Population	14
4.5. Source Population	14
4.6. Study population	14
4.7. Inclusion and Exclusion criteria.....	15
4.7.1. Inclusion criteria.....	15
4.7.2. Exclusion Criterion	15
4.8. Sample size determination.....	15

4.9. Sampling Procedure	16
4.10. Variables.....	16
4.10.1. Outcome Variables	16
4.10.2. Independent Variables	17
4.11. Measurement of variables	17
4.12. Data collection and handling	18
4.13. Data analysis	18
4.14. Ethical considerations	19
4.15. Dissemination plan.....	20
5. Results.....	20
5.1. Sociodemographic variables	20
5.2. Challenges and barriers Variables	21
5.3. Extent of preparedness and experience	22
5.4. Knowledge and practice research question results	22
5.4.1. Knowledge Assessment.....	22
5.4.2. Practice Assessment.....	24
5.5. Factors affecting preparedness	25
5.6. Factors affecting experience in managing poisoning	26
6. Discussion.....	26
7. Strengths and Limitations	29
8. Conclusion.....	30
9. Recommendations	30
10. References.....	30
11. Annexes	34
Annex I: Information Sheet	34
Annex II: Consent form	35
Annex III: Questionnaires	36

Abstract

Background: Acute poisoning is a significant global public health concern, contributing substantially to morbidity and mortality, particularly within low- and middle-income countries including Ethiopia. Despite its recognition as a priority by the Ethiopian Ministry of Health, challenges in healthcare professionals' preparedness and experience in managing these emergencies exists.

Objective: To assess the overall preparedness and experience of healthcare professionals (HCPs) in managing acute poisoning cases and identify associated factors at Kidus Petros Hospital, Addis Ababa, Ethiopia.

Methods: A cross-sectional study was conducted at Kidus Petros Hospital between November 2024 and May 2025. The study targeted HCPs, including nurses, physicians, and clinical pharmacists, who had managed poisoning cases in the past three years. A department-based stratified systematic random sampling method was used. Data were collected using a self-administered questionnaire. Preparedness was defined as achieving $\geq 75\%$ in both knowledge and practice. Experience was defined as ≥ 2 years managing poisoning cases. Data were analyzed using descriptive statistics and multivariate logistic regression to identify predictive factors using SPSS 23.0. Crude and adjusted odds ratios with 95% Confidence intervals were presented as measure of association. Statistical tests resulting in a p-value of less than 0.05 were considered statistically significant.

Results: A total of 242 healthcare professionals out of 265 invited participants (91.3% response rate) responded to the survey. Only 36% of healthcare professionals were classified as well-prepared for managing acute poisoning. Approximately one third (31%) of healthcare professionals reported more than two years of experience in managing poisoning cases, the number of cases managed was not assessed due to data limitations. Education level was found to be a statistically significant predictor for both preparedness and experience, with nurses having significantly lower odds of preparedness compared to specialists (AOR = 0.18, 95% CI: 0.04–0.829, $p = 0.028$).

Conclusion: Low preparedness (36%) and experience (31%) among HCPs, coupled with a theory-practice gap, highlight critical deficiencies, especially in nurses in poisoning management at Kidus Petros Hospital. This highlights the significance to implement focused interventions, such as high-quality training, mentorship, and ongoing professional development targeted to particular professional groups, in order to improve patient outcomes and overall preparedness in Ethiopia.

Keywords: Acute poisoning, healthcare professionals, preparedness, experience, Ethiopia, Kidus Petros Hospital.

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Abbreviations/Acronyms

EMA	Ethiopian Medical Association
ENT	Ear Nose throat
ER	Emergency room
HCP	Healthcare Professional
ICU	Intensive care unit
LMICs	Low and Middle-Income Countries
MOH	Ministry of Health
OB-GYN	Obstetrics and Gynecology
WHO	World Health Organization

1. Introduction

1.1. Background Information

Poisoning is defined as exposure to a toxic concentration of a substance that is likely to cause harm to an individual or adversely impair the function of any system within an organism[1].

Poisoning could be accidental or intentional. According to WHO estimates, accidental poisoning killed 193,460 people worldwide in 2012[1]. Moreover, intentional pesticide ingestion alone is thought to be responsible for about 370,000 deaths annually, with low- and middle-income countries accounting for 84% of these deaths[2].

Acute poisoning is a major public health concern around the world, with varying rates of mortality and morbidity across the globe. Despite this global recognition, epidemiological data concerning acute poisoning in Ethiopia remains very limited, not well-established, and largely unexplored[3–5]. However, the Ministry of Health of Ethiopia acknowledges acute poisoning as a priority public health issue, evidenced by initiatives to establish poison control centers and promote harmonized data recording systems[1]. Existing studies, though scarce, indicate a varying prevalence. Historical records from Addis Ababa (1981/82–1995/96) indicate an accidental poisoning rate of approximately 11 per 100,000 population, with higher rates among males and older adults. However, in this study, under-reporting and incomplete data suggest that these figures underestimate the true burden[6]. Poisoning cases accounted for at least 1.1% of all emergency center presentations in North Gondar between 2010 and 2014, with a suggestion of potentially rising incidence[7]. In Addis Ababa, the incidence in emergency departments of four referral hospitals was at least 0.53% from 2010 to 2015[8]. Furthermore, studies in Western Ethiopia highlighted that the incidence of poisoning can vary with seasonal changes, with pesticides and food poisoning identified as significant contributors[3].

Recent hospital-based studies in Ethiopia show that the majority of poisoning cases involve young adults, with female predominance[3, 9, 10]. The most common cause is intentional self-harm. According to a study done in Tikur Anbessa specialized hospital, 96.5% of poisoning cases were the result of intentional self-harm poisoning caused by a temporary quarrel or emotional disturbance[10]. Household chemicals, organophosphates, and prescribed drugs are among the most commonly identified toxic agents[9–11]. Most studies report that organophosphate

compounds are the leading cause of poisoning[3,4,13]. Case fatality rates reported in studies include 5.8%[9], 7.1%[3], 8.6%[10], 10.2% [11]and 17.5%[4].

A pediatrics study at Gondar University found that poisoning accounted for 1.5% of pediatric emergency admissions. The most frequent cause was accidental (75.6%) and organophosphates were the most common agents[13].

Developed countries have better preparedness and response systems due to advanced healthcare infrastructures, established poison control centers, and systematic in-service training programs for healthcare professionals. Developing countries, including Ethiopia , frequently face limited resources, inadequate training, and lack of standard treatment protocols[5].

Similar patterns and challenges can be seen across Africa. For example, a study conducted in northern Uganda found that poisoning accounts for 1% of hospital admissions, with the most common causes being alcohol intoxication, snake bites, and organophosphates[14]. Poisoning management challenges include a lack of antidotes, late presentation, economic barriers, staff shortages, and limited awareness. Notably, only 30% of patients who need specific antidotes receive them[14]. A study conducted in Lagos State, Nigeria, also showed similar challenges and emphasized the importance of strong healthcare facility preparedness to manage poisoning[15] which mirrors the challenges encountered in Ethiopian healthcare settings.

Poisoning cases are increasing day by day due to the easy and vast availability of the causative agents[16]. Additionally, this increase in hospital admission is also attributed to changes in lifestyle and socio-psychological pressures[8, 11].

Studies in Ethiopia have shown inadequate knowledge and practice regarding management of acute poisoning among healthcare professions especially nurses[17–19]. The presence of systemic factors such as limited resources, inadequate in-service training and lack of standard treatment protocols exacerbates these gaps[1,5].

Given the documented burden of acute poisoning in low-resource settings and the patterns observed in various Ethiopian studies, the preparedness and experience of healthcare professionals tasked with managing acute poisoning cases are extremely important.

Understanding the status of these conditions in Ethiopian settings helps develop targeted interventions and improve overall emergency response strategies in cases of acute poisoning in the country and beyond.

1.2. Significance of the Study

Assessing the preparedness and experience of Kidus Petros Hospital's healthcare professionals in managing acute poisoning cases is important for a variety of reasons. First and for most, it contributes to the better patient outcomes by addressing existing gaps and improving poisoning emergency response. Second, it informs healthcare professional in-service training and development initiatives by identifying gaps and specific needs that can be addressed through tailored interventions. The study findings inform resource allocation and policy-making in the provision of antidotes, equipment, and clinical guidelines. Academically, the study findings increase the evidence bases on acute poisoning, particularly in the Ethiopian context, while also addressing socio-demographic factors and providing contextually appropriate healthcare interventions.

1.3. The Rationale behind Selecting Kidus Petros Hospital

The presence of a specialized toxicology center that offers a unique opportunity to investigate various poisoning incidents and management approaches justifies the study's focus at Kidus Petros Hospital. Moreover, adequate patient flow at the hospital provides a wealth of data for understanding various aspects of acute poisoning management. The hospital is renowned for its in-service training center which could provide information on the effectiveness of current programs. The results of this study could serve as a benchmark for other healthcare facilities in Ethiopia and similar settings. The study conducted at Kidus Petros Hospital provides a holistic view of the current state of poisoning management by investigating various types of poisonings and associated challenges.

1.4. Problem Statement

Acute poisoning is a serious global health concern that leads to significant morbidity and mortality, particularly in developing nations. Poisoning cases are increasing on a daily basis[16]. Emergency rooms in Ethiopia routinely see cases of poisoning in both adults and children. Accidental poisoning in children and intentional self-harm, especially among young women, are

common causes that are frequently associated with social problems. Organophosphates, household chemicals, and drugs are the main toxic agents[3, 4, 11,14].

Effective initial management by healthcare professionals is critical for patient outcomes by reducing morbidity and mortality[1,14]. The cumulative effect of professional preparedness gaps, as determined by knowledge and practice, experience and resource gaps leads to delayed initiation of critical resuscitative efforts, suboptimal patient outcomes, and increased morbidity and mortality from acute poisoning [2, 21]. Therefore, there is a pressing need to systematically assess and enhance the preparedness and practical experience of healthcare professionals to ensure timely and effective management of acute poisoning cases across the country.

2. Literature review

Acute poisoning is a significant and persistent public health concern, frequently leading to emergency department presentations and demanding expert intervention[20]. Healthcare professionals, including nurses and physicians, are on the frontline of managing these critical cases[21, 22]. However, a substantial body of evidence from previous studies compellingly argues that significant and concerning gaps in both knowledge and practical skills persist among these providers, potentially jeopardizing patient outcomes. These deficits are not trivial; less knowledge among nurses, for instance, has been directly linked to medical errors[20].

2.1. Knowledge and Practice gap in Ethiopia and other LMICs

Multiple studies from Ethiopia demonstrate varying levels of nurse knowledge and practice concerning acute poisoning management. According to a 2018 study at Dessie Referral Hospital in the Amhara region of Ethiopia, for example, the majority of nurses had a mean score of 73% on the initial poisoning management knowledge and 57.5% on the general poisoning knowledge, which were below the 75% threshold for satisfactory knowledge. Additionally, their self-reported practice was deemed to be inadequate[18]. Findings from a recent (2022) study in public hospitals in Bahir Dar City, northwest Ethiopia, presented a better view, indicating that more than half of the nurses had good level of knowledge (58.8%) and practice (62.2%)[17]. A study in South Gondar zone hospitals in 2021 reported that a large majority (88.5%) of nurses had good level of knowledge regarding the initial management of acute poisoning, although their practice was found to be insufficient[19]. These differing results across Ethiopian regions

underscore the variability in preparedness and suggest that findings from one locality may not be generalizable to others.

Studies from other LMIC settings echo concerns about insufficient nurse preparedness. Research among nurses in a tertiary care hospital in India in 2021 found that about 47% of participants scored less than 50% of the total knowledge score, indicating insufficient knowledge, and only 12.73% obtained more than 75%[20]. A study on critical care nurses in Egypt in 2020 also found that more than half (54.3%) of participants had poor knowledge about toxicological emergencies although most reported acceptable practices[22]. Another study in Cairo University Hospitals in 2013-2014 reported even more concerning results, with all (100%) of the studied nurses having an unsatisfactory knowledge level and an unsatisfactory practice level (<75%) regarding the detection and management of acute drug poisoning[23].

Deficiencies are not limited to nursing staff. A study done on interneers and registered medical practitioners at a tertiary care hospital in India showed a large majority (76.6%) were not aware of the toxidrome-based approach in clinical practice[24]. Another study assessing emergency clinicians found that while a majority (83.8%) passed a general knowledge test (scoring >50%), knowledge varied considerably across different toxicological topics[25].

These consistent findings of significant knowledge and practice gaps across multiple contexts, including different regions of Ethiopia, build a compelling argument that suboptimal preparedness in managing acute poisoning is a widespread issue among nurses in LMICs. While some studies present slightly better outcomes, none indicate universal or near-universal competency, leaving a substantial portion of the healthcare workforce potentially ill-equipped to handle these critical emergencies effectively[21, 22, 24, 26].

2.2. Factors associated with knowledge and practice

Acute poisoning management knowledge and practice seem to be consistently linked to a number of factors.

2.2.1. In-service training

A substantial association exists between improved knowledge and obtaining formal toxicology education or attending pertinent conferences or workshops[25]. The mean scores for general

knowledge were higher among nurses who received in-service training in the initial management of poisoning [18]. A lack of specialized training, on the other hand, was linked to inadequate knowledge and practice[18, 21, 23, 24].

2.2.2. Service Unit

Working in emergency and critical care units was positively associated with improved knowledge and practice [18, 21, 26, 27].

2.2.3. Educational Level and work experience

Higher educational credential was frequently linked to better knowledge and practice scores (e.g., BSc, MSc versus Diploma)[18, 21, 27]. Additionally, greater work experience was linked to better knowledge and practice scores in multiple studies[25, 27, 28].

2.2.4. Gender

A study in Bahir Dar found that being male had twice higher odds of better level of knowledge than female[17].

2.2.5. Availability of resources and standard treatment protocol

One reason for inadequate practice was the lack of standard treatment guidelines in medical facilities[18, 24, 27]. Many nurses believed that resources must be available[18, 20].

2.2.6. Workload

According to a study conducted in Egypt, it was suggested that "increasing work overload" was a contributing factor in poor practice[28].

2.3. Conceptual Framework

This conceptual framework outlines the key factors hypothesized to influence preparedness for the management of acute poisoning based on findings from the reviewed literature. In this context, preparedness is primarily understood through the lens of knowledge and practice concerning the assessment and management of poisoned patients.

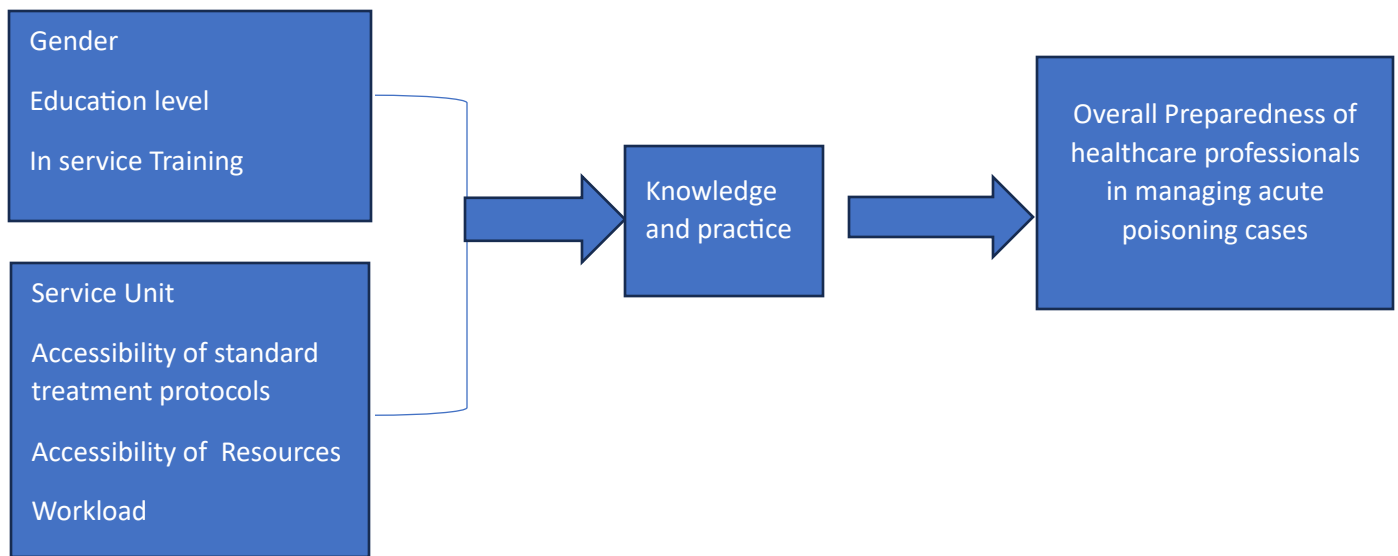


Figure 1: factors affecting knowledge and practice(preparedness) adapted from existing literatures [17]–[20], [26].

3. Objectives

3.1. General Objective

The general objective of this study was to assess the overall preparedness and experience of healthcare professionals at Kidus Petros Hospital in managing cases of acute poisoning and its associated factors.

3.2. Specific Objectives

- To assess the level of knowledge and practice of healthcare professionals regarding different types of poisons and their management.
- To identify common challenges encountered by healthcare professionals in the management of acute poisoning cases and identify factors predicting overall levels of preparedness and experience.

4. Methods

4.1. Study setting

The study took place at Kidus Petros Hospital which is located near Entoto in Addis Ababa. The hospital was originally established in 1953 at Mesalemiya as a tuberculosis demonstration

center with support from Emperor Haile Selassie. At Mesalemiya, the hospital offered outpatient services. In 1955, it moved to its current location and began offering internal medicine and maternal health services.

Over the years, Kidus Petros expanded its services. By 1997, it included emergency and ICU care. In 2017, it became a major toxicology center in Addis Ababa. With 300 inpatient beds, including ICU and specialized units, it stands as a major facility for handling poisoning and other complex emergencies.

There are approximately 928 healthcare professionals (HCPs), including general practitioners (164), nurses (308), clinical pharmacists (62), specialists (102), physiotherapists (5), medical laboratory technicians (67), anesthesia professionals (31), public health officers (62), midwives (61), radiographers (37), dentists (9), optometrists (4), environmental health specialists (5), psychiatry professionals (4), Integrated emergency surgical officers (IESOs) (4), public health education and promotion professionals, and infectious disease professionals (3). The current study was conducted over the period of six months from November 2024 to May 2025.

4.3. Study Design

A facility based cross-sectional study design was conducted to assess the level of preparedness and experience of health care professionals in managing poisoning and factors associated with the two outcomes at Kidus Petros Hospital.

4.4. Target Population

All Health care professionals working at Kidus Petros Hospital, Addis Ababa and are managing acute poisoning cases.

4.5. Source Population

All health care professionals (nurses, physicians and clinical pharmacists) who are currently working at Kidus Petros specialized hospital. There are an estimated 636 healthcare professionals (HCPs) working as general practitioners, nurses, specialists, and clinical pharmacists.

4.6. Study population

Sampled healthcare professionals working at Kidus Petros Hospital.

4.7. Inclusion and Exclusion criteria

4.7.1. Inclusion criteria

- Health care professionals with work experience of 6 months and above
- Healthcare professionals who have directly managed or been involved in the management of poisoning cases. That is, those who have rotated to emergency (pediatrics and adult), ICU and toxicology center in the past 3 years.
- Those who were on duty during data collection period (December 2024 to April 2025).

4.7.2. Exclusion Criterion

Those HCPs who refuse to give consent to participate in the study.

4.8. Sample size determination

The sample size (n) was calculated using the single population proportion formula with a 95% confidence level ($Z_{\alpha/2} = 1.96$), a 5% margin of error ($d = 0.05$), and an assumed prevalence of 50% for preparedness. This assumption was grounded in findings from previous studies focused on nurses, as detailed in the literature review, where a substantial proportion demonstrated varied levels of knowledge and practical skills in poisoning management. Given that specific prevalence data were available primarily for nurses and not for other healthcare professionals (HCPs), this 50% served as a conservative estimate across all HCPs involved in managing poisoning at Kidus Petros Hospital.

The sample size was estimated using the following single population formula:

$$n = \frac{\left(\frac{Z_{\alpha}}{2}\right)^2 \times p(1 - p)}{d^2}$$

Where;

n = Minimum sample size for a statistically significant survey

Z = Normal deviant at the portion of 95% confidence interval two tailed test is = 1.96

P = Proportion of health care professionals who are prepared to provide poisoning management which is assumed to be 50% in the current study

d = margin of error which is taken as 5%= 0.05

$$1.96*1.96* 0.5(1-0.5)/0.05*0.05= 384$$

Since the source population was less than 10,000, the following finite population correction formula was used:

$$n_f = \frac{n_0}{1 + n_0/N}$$

Where, n_f = the final corrected sample size

n_0 = The calculated sample size using the appropriate formula

N = the total source population which is <10,000

Thus, $n_f = 384 / (1 + (384 / 636))$. The sample size was 239.

Given that participation was voluntary, we anticipated a non-response rate of 10%. Therefore, to account for this, the final non response rate adjusted sample size became 265 participants.

4.9. Sampling Procedure

The sampling method for this study employed a department-based stratified systematic random sampling strategy. The participants eligible for this study were healthcare professionals who had worked or been assigned to the ICU, Toxicology, or Emergency departments within the last three years. These departments were chosen because they played a crucial role in the management of poisoning cases. Participants were stratified by their experience in these specific departments, regardless of their current roles. We calculated a proportionate sample size for each department based on the total number of eligible professionals to ensure representative sampling. Systematic sampling was used within each stratum by compiling a list of all eligible professionals and selecting every 2nd person, starting from a randomly determined point. The value of k was determined by dividing the total number of professionals in the stratum by the needed sample size for that department.

4.10. Variables

4.10.1. Outcome Variables

Below were the outcome variables for the study: (See measurement of variables section for technical definitions of variables).

- Preparedness of health care professionals in managing acute poisoning
- Experience of health care professionals in managing acute poisoning

4.10.2. Independent Variables

The Independent variables for the study were:

- level of education
- challenges and barriers to manage acute poisoning (status of having in-service training and work overload)
- demographic and professional factors such as age, sex, occupation, and years of experience.

4.11. Measurement of variables

Preparedness refers to healthcare professionals' readiness to effectively manage poisoning cases, which is multifaceted and includes core aspects such as knowledge as well as clinical competence in practice relevant to poisoning specific cases.

Knowledge: familiarity with acute poisoning management which includes; information and facts acquired through experience and education on poisoning. Measurement of this outcome was assessed through 11 knowledge-based items. (see questionnaire section 2 Q1-Q11). Score level of 75-100% to these questions was considered as high level of knowledge; this threshold was similar to a study conducted in South Gondar[19] .

Practice: practical application of knowledge and the ability to follow standard procedures during the management of poisoning cases. This was measured through 10 clinical practice questions. (see questionnaire section 3 Q1-Q10). Score level of 75-100% was taken as good level of practice [19].

Preparedness was defined as score level of greater than and equal to 75% in both knowledge and practice.

Experience: refers to the number of years the healthcare professionals managed poisoning cases. A survey question that asked participants to specify the total number of years they have spent managing poisoning cases was used to measure this outcome variable.

4.12. Data collection and handling

A self-administered questionnaire adopted from different literatures was used for data collection. Google forms were developed to allow access to the questionnaire online. Data were collected online from health care workers who volunteered to participate in the study. However, only 70 participants were able to respond so data collection method was switched to paper based to reach the determined sample size.

The tools were divided into five sections: Sociodemographic characteristics (6 items), questions that measure knowledge of nurses (11 items), practice questions (10 items), Experience question (1 item), 4 items of Likert scale questions that measure challenges and barriers.

The questionnaire was designed from the MOH poisoning manual prepared in 2020 and also adopted from previous studies such as the South Gondar study [19] and Bahir Dar study[17]. After the development of the instrument, the tool was tested for validity and reliability. The adapted tools, originally sourced from prior studies, were validated and showed to have a reliability measure, Cronbach's alpha, of 0.92[19]. Those survey items from used in previous research were ensured that the questions align well with the constructs.

A pretest was conducted prior to data collection to check if there were issues with the questionnaire.

Data were checked for completeness and cleaned using Epi-Info 7.2 before transferred to SPSS version 23.0 for data analysis.

4.13. Data analysis

After the process of cleaning and checking was completed, data was summarized for providing an overview of the respondents' demographics, knowledge levels, practice, preparedness experience, and perceived challenges in managing poisoning cases.

Frequency tables were employed to answer the fundamental question of preparedness and experience of HCPs in treating poisoning cases. More specifically, summary statistics was provided for the scores for

i) Preparedness:

- Knowledge questionnaire
- Clinical competence questionnaire

ii) Experience:

- Clinical experience with poisoning cases questionnaire

Furthermore, in order to assess which factors were predictive of preparedness and experience of HCPs, two multivariate logistic regression models - one for preparedness and one for experience – were employed. In this model, the dependent (outcome) variables were preparedness and experience in each of the two models while the independent variables included demographic and professional information, education level as well as scores on in-service training and workload.

4.14. Ethical considerations

The protocol was approved by the Scientific and Ethics Review Committee of Center for Innovative Drug Development and Therapeutic Trials for Africa (CDT Africa) and by the Kidus Petros Research Ethical Review Committee.

The study was carried out in accordance with moral standards. Regardless of the method used to collect the data, all participants provided written informed consent. An information sheet outlining the study's objectives, the voluntary nature of participation, confidentiality protocols, and participants' rights was presented on the first page of the online survey. Only those who volunteered moved on to the survey. A printed consent form and information sheet were supplied for the paper-based survey. Before filling out the questionnaire, participants had time to read the material, ask questions, and give their written consent. In both formats, confidentiality and anonymity were rigorously upheld. No personally identifiable data was collected. The data was only accessible to the study's principal investigator.

4.15. Dissemination plan

The results will be submitted to Kidus Petros Hospital, CDT-Africa, EMA and Ethiopian Federal Ministry of Health. Further efforts will be made to publish the findings on peer reviewed national and/or international journals.

5. Results

5.1. Sociodemographic variables

Of 265 invited participants who were eligible to the study, only 242 HCPs responded, making the response rate 91.3%.

Majority of the participants were aged 30–39 years (63.2%). Most participants were male (70.7%) and single (59.5%). Regarding education level, BSc Nurses comprised 50.4% of the respondents, followed by General Practitioners (25.6%), MSc Nurses (12.4%), Clinical Pharmacists (8.3%), and Specialists (3.3%). Nearly half of the participants (48.8%) were from the Adult Emergency Unit, 24.8% from Intensive Care Unit, 18.6% from Pediatrics Emergency unit, and 7.9% from the Toxicology Unit. The majority had 6-10 years of experience (49.2%), with 33.5% having 3-5 years (Table1).

Table 1: *Socio-demographic characteristics among healthcare professionals (n=242)*

Variable	Category	Frequency	Percent
Age	20-29	84	34.7
	30-39	153	63.2
	40-49	5	2.1
Sex	Male	171	70.7
	Female	71	29.3
Marital Status	Single	144	59.5
	Married	98	40.5
Educational Level	BSc Nurse	122	50.4
	MSc Nurse	30	12.4
	Clinical Pharmacist	20	8.3
	General Practitioner	62	25.6
	Specialist	8	3.3
Service Unit	Adult ER	118	48.8
	Pediatrics ER	45	18.6
	ICU	19	7.9
	Toxicology	60	24.8
Overall years of clinical experience	<=2 years	22	9.1
	3-5 years	81	33.5

6-10 years	119	49.2
>= 11 years	20	8.2

ER- Emergency Unit ICU-Intensive Care Unit

5.2. Challenges and barriers Variables

Only 43 (17.8%) of respondents had received in-service training in poisoning management.

Among those trained, 81.4% described the frequency as 'very infrequent' or 'infrequent', and 83.7% rated the adequacy as 'inadequate' or 'very inadequate' (Table 2).

Table 2: *Frequency and adequacy of in-service training among those who received in-service training (n=43).*

Variables	Rating	Frequency (n)	Percent
In-service training frequency	Very	16	37.2
	Infrequent		
	Infrequent	19	44.2
	Occasional	8	18.6
In-service training	Very	18	41.9
	Inadequate		
Adequacy	Inadequate	18	41.9
	Adequate	7	16.3

A majority of healthcare professionals perceived resource accessibility as poor. Specifically, 60% rated resources as either 'Very Inaccessible' (20.7%) or 'Inaccessible' (39.3%), while only 40.1% reported resources to be accessible to varying degrees. Half of the respondents (50.0%) indicated that access to standard treatment protocols was limited, rating it as 'Very Inaccessible' (15.7%) or 'Inaccessible' (34.3%). Work load was perceived as moderate by a significant majority (Table 3).

Table 3: *Challenges and barriers as perceived by the healthcare professionals (n=242).*

Variables	Rating	Frequency (n)	Percent
Accessibility of resources	Very Inaccessible	50	20.7
	Inaccessible	95	39.3

	Accessible	59	24.4
	Mostly/Very Accessible	38	15.7
Accessibility of treatment protocols	Very Inaccessible	38	15.7
	Inaccessible	83	34.3
	Accessible	103	42.6
	Mostly/Very Accessible	18	7.4
Work Load	Very light	38	15.7
	Light	29	12.0
	Moderate	92	38.0
	Heavy	63	26.0
	Very heavy	20	8.3

5.3. Extent of preparedness and experience

Preparedness was computed and classified according to the definition. (see measurement of variables)

Preparedness in managing acute poisoning is a composite variable of knowledge and practice. In this study, 182 (75.6%) of healthcare professionals demonstrated high level knowledge regarding poisoning management and only 110 (45.5%) exhibited good level of clinical practice. The mean knowledge score regarding acute poisoning management was 9.15 out of a possible 11 (SD = 1.23). The mean practice score was 7.30 out of 10 (SD = 1.54). Overall, 87(36%) of participants were classified as well prepared. Only 75(31%) of the healthcare professionals reported having more than two years of experience in managing poisoning cases.

5.4. Knowledge and practice research question results

5.4.1. Knowledge Assessment

Most healthcare professionals demonstrated high level of knowledge of poisoning management fundamentals. Nearly all respondents (98.8%) correctly identified poison as any substance capable of causing damage or dysfunction by its chemical activity. A large majority (88.8%) understood that dose and time of ingestion are important considerations in managing poisoning cases. Additionally, 90.9% recognized that women are more likely than men to intentionally

ingest poison in suicide attempts. Prioritizing airway, breathing, and circulation (ABC) during severe acute poisoning was correctly identified by 93.4% of participants. Awareness of gastrointestinal decontamination principles was high, with 94.6% acknowledging that it depends on the poison type, time from ingestion, and severity. However, some important knowledge gaps were evident. Only 48.8% correctly recognized that gastric lavage is not indicated for all poisonings, particularly those involving kerosene or corrosive substances. Furthermore, only 55% correctly stated that atropine should not be administered in every circumstance during organophosphate poisoning, indicating uncertainty around antidote use (Table 4).

Table 4: Knowledge questions result

No	Knowledge questionnaire items	Yes	No
1	Poison is any substance capable of producing damage or dysfunction in the body by its chemical activity.	239* (98.8%)	3 (1.2%)
2	Dose ingested and time of ingestion are not very necessary consideration when managing poisoning cases in emergency department.	27 (11.2%)	215* (88.8%)
3	It is always very important to treat the poison not the patient.	33 (13.6%)	209* (86.4%)
4	The commonest cause of poisoning in developing countries is pesticide.	195* (80.6%)	47 (19.4%)
5	Women are more likely to take poison intentionally in an attempt to commit suicide than men.	220* (90.9%)	22 (9.1%)
6	Considering the dose and time of ingestion is important in managing the poisoning cases in Emergency.	228* (94.2%)	14 (5.8%)
7	Maintaining ABC is the priority during severe acute poisoning.	226* (93.4%)	16 (6.6%)
8	Atropine should be administered in any circumstance during organophosphate poisoning.	133* (55%)	109 (45%)
9	Gastrointestinal (GI) decontamination is dependent on the type, time and severity of poison ingested.	229* (94.6%)	13 (5.4%)
10	Gastric lavage is indicated for all cases of poisoning except for ingested kerosene or corrosive substances.	118* (48.8%)	124 (51.2%)
11	Vomiting is an alert for conscious patient who has ingested a substantial amount of a toxic substance within 60 minutes of presentation.	203* (83.9%)	39 (16.1%)

*No of respondents who answered correctly

5.4.2. Practice Assessment

All participants (100%) answered that maintaining airway, respiration, and circulation is a priority in severe acute poisoning, reflecting strong awareness of essential emergency care principles. Most (76%) correctly answered that atropine should never be administered in organophosphate poisoning, showing reasonable understanding of specific treatment. The decision-making criteria for gastrointestinal decontamination were well understood by 95.5% of respondents.

Despite this, critical practice deficits were observed. The majority (69.4%) incorrectly believed that most poisonings have specific antidotes. Only 31.4% correctly understood the role of activated charcoal, with many mistakenly believing it increases absorption rather than adsorbing toxins. Similarly, 33.5% recognized that gastric lavage is contraindicated for kerosene or corrosive ingestions. Half of the respondents (50.8%) correctly understood that the effectiveness of gastric lavage decreases as time from ingestion increases (Table 5).

Table 5: *Practice questions result*

No	Practice questionnaire items	Yes	No
1	In severe acute poisoning, maintaining adequate airway, respiration and circulation are always a priority.	242* (100%)	0 (0%)
2	In case of organophosphate poisoning atropine should not be administered in any circumstance.	58 (24%)	184* (76%)
3	Nearly all poisoning encountered in accident and emergency department have their specific antidote.	168 (69.4%)	74* (30.6%)
4	The decision to perform Gastrointestinal (GI) decontamination should be based upon the specific poison(s) ingested, time from ingestion to presentation, and the predicted severity of the poison.	231* (95.5%)	11 (4.5%)
5	Emesis is to be considered in an alert, conscious patient who has ingested a substantial amount of a toxic substance within 60 min of presentation.	212* (87.6%)	30 (12.4%)
6	Activated charcoal can increase absorption of a wide range of poisons from the gastro-intestinal tract to the entire human system.	76 (31.4%)	166* (68.6%)

7	Gastric lavage is indicated for patients who have ingested kerosene or corrosive substances within an hour of presentation.	81 (33.5 %)	161* (66.5 %)
8	The effectiveness of gastric lavage increases as the time between ingestion and treatment increases.	119 (49.2%)	123* (50.8%)
9	The volume of lavage fluid aspirated should approximate to the amount of fluid given.	203* (83.9%)	39 (16.1%)
10	Patients presenting following ingestion of controlled/ slow released substances may benefit from decontamination even after a longer delay (e.g. more than 2–4 h).	171* (70.7%)	71 (29.3%)

*No of respondents who answered correctly

5.5. Factors affecting preparedness

Following the univariate analysis, variables that showed a P value of less than 25% were included in the multivariate regression model to ensure the variables that might be important confounders are not prematurely excluded from the multivariable model, even if they don't show strong statistical significance individually [29]. Based on this, age group and education level were included in the multivariate model. However, only education level was found to be statistically significant (p-value=0.000) in the multivariate binary logistic regression model at 5% level of significance. Nurses, who primarily handle initial assessments, had lower odds of preparedness compared to specialists, who oversee complex cases, reflecting differences in educational training rather than direct role equivalence. Accordingly, after adjusting for other covariates, compared to specialists, nurses had 82% lower odds (AOR = 0.18, 95% CI: 0.04–0.829, p = 0.028) of preparedness. Clinical Pharmacists and General Practitioners showed no significant difference in odds of preparedness compared to Specialists (Table 6).

Table 6: Factors affecting preparedness

Variables	Preparedness		COR (95% CI)	AOR (95% CI)	P-value
	Well Prepared	Not prepared			
Education levels					0.000
Specialist	5	3	1.00	1.00	
MSc/BSc					
Nurse	32	120	0.160(0.036-0.705)	0.182(0.040-0.829)	0.028
Clinical					
Pharmacist	11	9	0.733(0.136-3.943)	0.809(0.146-4.495)	0.802

General practitioner	39	23	1.017(0.222-4.657)	1.034(0.225-4.740)	0.966
Age					0.548
COR- Crude odds ratio AOR- Adjusted odds ratio CI – Confidence Interval					

5.6. Factors affecting experience in managing poisoning

Education level, marital status, and in-service training were included for further multivariable analysis after the univariate analysis because their respective P values were less than 25%.

Education level was found to be statistically significant (p-value=0.003) in the multivariate binary logistic regression model at 5% level of significance. Compared to specialists, nurses had significantly lower odds of having more experience in poisoning management although not statistically significant (Table 7).

Table 7: Factors affecting experience in managing poisoning

Variables	Experience in managing poisoning		COR (95% CI)	AOR (95% CI)	P-value
	< 2 years	>2 years			
Education levels					0.003
Specialist	4	4	1.00	1.00	
MSc/BSc Nurse	119	33	0.277 (0.066-1.168)	0.395 (0.087-1.788)	0.228
Clinical Pharmacist	10	10	1.00	1.188 (0.222-6.361)	0.841
General practitioner	34	28	0.824 (0.188-3.600)	1.181 (0.249-5.597)	0.834
Marital Status					0.162
Single	94	50	0.644	1.488 (0.823-2.688)	0.188
Married	73	25	1.00	1.00	
In-service training received					0.116
No	143	56	0.041	0.562 (0.265-1.188)	0.131
Yes	24	19	1.00	1.00	
COR – Crude odds ratio AOR- Adjusted odds ratio CI- Confidence Interval					

6. Discussion

The study showed that 36.0% of healthcare professionals are well-prepared. While the majority of healthcare professionals (75.6%) showed a high level of knowledge on the management of

poisoning, less than half (45.5%) showed good level clinical practice. Moreover, practical experience appears to be limited, with only 31.0% of respondents reporting more than two years of experience in treating poisoning cases. Results showed that education levels are a consistent and statistically significant predictor for both preparedness and experience. Healthcare professionals with higher qualifications were significantly more likely to be well-prepared and experienced. Small number of HCPs (43) received in-service training relevant to acute poisoning management. Receiving in-service training was not a predictor of preparedness and experience in this study. Further analysis has shown that 81.4% of those who have completed in-service training have identified the in-service training frequency as "very infrequent/ infrequent" and 83.7% consider the in-service training to be "very inadequate/inadequate". More than half of respondents assessed access to protocols and resources as poor.

The high percentage (75.6%) of healthcare professionals demonstrating a high level of knowledge seems relatively encouraging compared to other studies. A study in South Gondar showed that 88.5% of nurses had a high level of knowledge of acute poisoning[19]. On the other hand, in Bahir Dar 58.8% of nurses had high level knowledge, which is lower but still represents a majority[17]. A study in Dessie, reported a 73% knowledge mean score which was below the satisfactory threshold[18]. Studies conducted in Egypt have reported mixed findings regarding healthcare professionals' knowledge on the management of poisoning generally points to a lower level of knowledge compared to the findings of this study. For instance, a study showed that 100% of nurses had insufficient knowledge of drug poisoning[23], while another report indicated that more than half (54.3%) of nurses in critical condition have poor knowledge of toxicological emergencies[22]. Also, a study in Ranchi, India, found 43.8% of nurses had unsatisfactory knowledge[20].

Less than half (45.5%) showed good level of practice in this study, consistent with findings of South Gondar (52.3%)[19] and Bahir Dar (62.6%)[17]. Poor clinical practice is also documented outside Ethiopia; For example, a study in Cairo reported insufficient practices in poisoning management[23]. However, some Egyptian studies found positive correlations between knowledge and practice, with acceptable practice levels(76.5%) in critical care nurses[22]. The

discrepancies between knowledge and practice show that knowledge alone does not guarantee effective clinical application.

There is strong evidence from earlier studies that education level is a reliable indicator of preparedness. Higher qualifications are associated with better knowledge and practice, according to studies conducted in Dessie[18], Bahir Dar[17], Kenya[26], India[24] and Australia/New Zealand[21]. This emphasizes how crucial higher education and ongoing professional development are to improving poisoning management knowledge and practice.

Compared to most studies the finding that only 17.8% of respondents received in-service training is significantly lower. 49.1% of nurses had received formal in-service training in acute poisoning management in Bahir Dar[17]. Similarly, a study in Kenya reported that 42.7% of nurses had undergone formal in-service training in acute poisoning after their basic nursing qualifications[26]. In contrast, a study involving emergency clinicians, primarily from Australia, found that nearly two-thirds (62.1%) had received formal in-service training in toxicological emergencies[21]. This discrepancy underscores the significant differences in in-service training opportunities between low- and middle-income countries (LMICs) and the developed world. In-service training did not predict experience or preparedness in this study, which was unexpected. On the contrary, in-service training was positively associated with knowledge and practice in studies conducted in Dessie[18], India[20], Bahir Dar[17], Kenya[26], and Egypt[23]. This conclusion was probably influenced by the study's perceived infrequency and inadequate training. Healthcare professionals consistently voice a need for more frequent, high-quality in-service training in all settings. For instance, 100% of nurses in Cairo[23] had not received any official poisoning management training, whereas 82% of nurses in Dessie[18] and 88.2% of nurses in Kenya[26] indicated that they needed more training.

Many respondents gave access to resources and standard treatment protocols low ratings, which is indicative of a common problem in environments with limited resources. Similar results have been documented in Dessie[18], South Gondar[19], Kenya[26], Sri Lanka[27], Uganda,[14] and Nigeria[15], where insufficient resources and a lack of guidelines make it difficult to manage poisonings effectively. The difficulties brought on by insufficient in-service training and practical experience are exacerbated by this systemic barrier.

The discrepancy between knowledge and practice is probably partly due to limited hands-on experience in treating poisoning cases. Only a minority of healthcare professionals had more than two years of experience, indicating insufficient clinical exposure to build up competences. This underlines the need for continuous supervised clinical practice alongside quality in-service training to bridge the gap between theory and application.

These findings suggest that improving the management of poisoning requires a versatile approach: improving the frequency and quality of in-service training programs, extending access to clinical protocols and resources, and increasing practical clinical exposure. Future research using qualitative methods could examine the perceptions and experiences of health professionals in the field of in-service training and clinical challenges, which could guide the development of tailor-made context-sensitive interventions to strengthen capability.

7. Strengths and Limitations

This study generated new evidence in the area of preparedness and experience in poisoning management to inform facility managers and policy makers for a corrective and preventive action in the area of poisoning management.

However, the cross-sectional design limits the ability to infer causal relationships between the predictors and outcomes. Because data were collected at a single point in time, it is not possible to determine the directionality or temporality of the observed associations.

Certain variables that might influence preparedness and experience—such as the quality and content of in-service training programs, frequency of exposure to poisoning cases, and organizational support—were not fully addressed due to methodological constraints and the scope of data collection.

Additionally, reliance on self-reported measures may introduce response bias or social desirability bias, potentially affecting preparedness levels. To minimize bias, anonymity was maintained to encourage honest responses. Moreover, validated instruments were used and statistical adjustments were applied to control for potential confounders in the analysis.

8. Conclusion

The study highlights a low level of preparedness (36%) and limited experience of healthcare professionals in managing acute poisoning cases, especially nurses. This deficit implies a critical need for specific interventions such as improved practical training, mentoring and continuous professional development adapted to this group. Strengthening the clinical experience of nurses is expected to improve overall preparedness and patient outcomes in the treatment of poisoning cases.

9. Recommendations

In order to improve the management of acute poisoning, it is essential to improve the quality and relevance of the in-service training while increasing its frequency and regularity. The inclusion of feedback from staff on the adequacy of in-service training and the accessibility of clinical protocols in continuous quality improvement initiatives may help to ensure that in-service training meets the real needs of healthcare professionals. In addition, conducting qualitative research can give a deeper insight into the experiences and expectations of health professionals in relation to poisoning management training. Setting up a mentoring model that links experienced staff to junior professionals can further support learning through clinical supervision. Adapting in-service training modules to suit the professional background of participants, such as offering refresher courses for nurses and specialized toxicological simulation workshops for physician and pharmacists.

Furthermore, reviewing patient records, conducting a scenario-based observation study, and performing a hospital audit will support findings and improve care quality at Kidus Petros Hospital. Expanding the research to include multiple centers will make the results more generable.

10. References

- [1] A. Ababa, "Poisoning and Drug Overdose Management Training for HealthCare Professionals," no. March, pp. 1–154, 2020.
- [2] N. R. Neumann, "Medical Toxicology Education and Global Health : It is Still a World of Limited Resources in Low- and Middle-Income Countries," pp. 358–360, 2020.

- [3] A. H. Woyessa and T. Palanichamy, "Patterns, Associated Factors, and Clinical Outcomes of Poisoning among Poisoning Cases Presented to Selected Hospitals in Western Ethiopia: Hospital-Based Study," *Emerg. Med. Int.*, vol. 2020, no. April, pp. 1–9, 2020, doi: 10.1155/2020/5741692.
- [4] A. Teym *et al.*, "Patterns, Clinical Outcome, and Factors Associated with Poisoning Outcomes among Poisoned Patients in Northwest Ethiopia," *SAGE Open Nurs.*, vol. 10, 2024, doi: 10.1177/23779608231226081.
- [5] E. T. G/Mariam, "Global epidemiology of acute Poisoning with an Emphasis to Ethiopia: Systematic Review," *Int. J. Pharma Sci. Sci. Res.*, vol. 2, no. 4, pp. 161–171, 2016, doi: 10.25141/2471-6782-2016-4.0161.
- [6] A. A. Bekry, "Trends in suicide , parasuicide and accidental," *Ethiop. J. Heal. Dev.*, vol. 13, no. 3, pp. 247–262, 1999, [Online]. Available: <https://www.ejhd.org/index.php/ejhd/article/download/921/676/>
- [7] G. M. Adinew, A. T. Woredekal, E. L. DeVos, E. M. Birru, and M. B. Abdulwahib, "Les cas d'intoxication et leur traitement dans les services d'urgence des hôpitaux d'urgence dans le nord-ouest de l'Ethiopie," *African J. Emerg. Med.*, vol. 7, no. 2, pp. 74–78, 2017, doi: 10.1016/j.afjem.2017.04.005.
- [8] M. Eyasu, T. Dida, Y. Worku, S. Worku, and M. Shafie, "Acute poisonings during pregnancy and in other non-pregnant women in emergency departments of four government hospitals, Addis Ababa, Ethiopia: 2010-2015," *Trop. Med. Int. Heal.*, vol. 22, no. 10, pp. 1350–1360, 2017, doi: 10.1111/tmi.12940.
- [9] E. Teklemariam, S. Tesema, and A. Jemal, "Pattern of acute poisoning in Jimma University Specialized Hospital, South West Ethiopia," *World J. Emerg. Med.*, vol. 7, no. 4, p. 290, 2016, doi: 10.5847/wjem.j.1920-8642.2016.04.009.
- [10] M. Desalew, A. Aklilu, A. Amanuel, M. Addisu, and T. Ethiopia, "Pattern of acute adult poisoning at Tikur Anbessa specialized teaching hospital, a retrospective study, Ethiopia," *Hum. Exp. Toxicol.*, vol. 30, no. 7, pp. 523–527, 2011, doi: 10.1177/0960327110377520.
- [11] B. Zemedie, M. Sultan, and A. Zewdie, "Acute Poisoning Cases Presented to the Addis Ababa Burn, Emergency, and Trauma Hospital Emergency Department, Addis Ababa,

- Ethiopia: A Cross-Sectional Study,” *Emerg. Med. Int.*, vol. 2021, pp. 1–5, 2021, doi: 10.1155/2021/6028123.
- [12] A. Getie and Y. M. Belayneh, “A retrospective study of acute poisoning cases and their management at emergency department of Dessie Referral Hospital, Northeast Ethiopia,” *Drug. Healthc. Patient Saf.*, vol. 12, pp. 41–48, 2020, doi: 10.2147/DHPS.S241413.
- [13] Y. M. Molla, K. D. Belachew, G. W. Ayehu, and A. A. Teshome, “Acute poisoning in children in Ethiopia: a cross-sectional study,” *Sci. Rep.*, vol. 12, no. 1, pp. 1–8, 2022, doi: 10.1038/s41598-022-23193-x.
- [14] K. Opiro, D. Amone, A. Wokorach, M. Sikoti, and F. Bongomin, “Acute Poisoning Emergencies at Gulu University Teaching Hospitals in Northern Uganda: Prevalence, Outcomes and Clinical Challenges,” *East African J. Heal. Sci.*, vol. 7, no. 1, pp. 34–45, 2024, doi: 10.37284/eajhs.7.1.1711.
- [15] A. Joda, O. Ajetunmobi, and O. Olugbake, “Poisoning and its Management in Healthcare Facilities in Lagos State, Nigeria,” *Pharm. Biomed. Res.*, no. October, 2021, doi: 10.18502/pbr.v7i1.7352.
- [16] R. R. Singh, P. K. Yadav, and S. K. Tripathi, “A Narrative Review on Emergency Management of Poisoning,” *J. Clin. Diagnostic Res.*, no. August, 2023, doi: 10.7860/jcdr/2023/62534.18279.
- [17] O. Adal, Y. Hiamanot, A. Zakir, R. Regassa, and A. Gashaw, “Knowledge, Attitude, and Practice of Nurses Toward the Initial Managements of Acute Poisoning in Public Hospitals of Bahir Dar City, Northwest Ethiopia 2022: Cross-Sectional Study,” *SAGE Open Nurs.*, vol. 9, 2023, doi: 10.1177/23779608231157307.
- [18] A. M. Abebe, M. W. Kassaw, and N. E. Shewangashaw, “Assessment of knowledge and practice of nurses on initial management of acute poisoning in Dessie referral hospital Amhara region, Ethiopia, 2018,” *BMC Nurs.*, vol. 18, no. 1, pp. 1–9, 2019, doi: 10.1186/s12912-019-0387-2.
- [19] S. F. Tassew *et al.*, “Knowledge, attitude and practice of nurses working in South Gondar zone hospitals toward initial management of acute poisoning, 2021,” *Pan African Med. J. One Heal.*, vol. 7, 2022, doi: 10.11604/pamj-oh.2022.7.32.32311.

- [20] K. Kumari, M. S. Toppo, and M. S. Alam, "Assessment of Knowledge and Awareness Among Nurses of a Tertiary Care Hospital Regarding the Management of Acute Poisoning: A Cross-Sectional Study," *Cureus*, vol. 15, no. 3, 2023, doi: 10.7759/cureus.36781.
- [21] M. S. Ummah, "No 主観的健康感を中心とした在宅高齢者における 健康関連指標に関する共分散構造分析Title," *Sustain.*, vol. 11, no. 1, pp. 1–14, 2019, [Online]. Available: http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI
- [22] S. Saad Hassan, A. Abo El-Ata, and H. Abdu El-kader, "Critical Care Nurses' Knowledge and Practices About Toxicological Emergencies," *Port Said Sci. J. Nurs.*, vol. 8, no. 3, pp. 68–83, 2021, doi: 10.21608/pssjn.2021.75367.1108.
- [23] E. Nursing, "Nurses' Knowledge and Practices regarding Detection and Management of Acute Drug Poisoning at Cairo University Hospitals," 2013.
- [24] Mopuri Venkateswarlu, S. Rajasekhar Reddy, Pathakota Swarnalatha, Kattamreddy Ananth Rupesh, Galeti Chandrasekhar, and Shree Laya Vemula, "A Knowledge, Attitude and Practices Study on Clinical Toxicology among Internees and Registered Medical Practitioners at a Tertiary Care Hospital," *Indian J. Forensic Med. Toxicol.*, vol. 17, no. 3, pp. 84–90, 2023, doi: 10.37506/ijfmt.v17i3.19494.
- [25] W. T. Monteith J, Jelinek G, Karro J, Cadogan M, "Knowledge & Confidence in Managing Toxicological Presentations," *ASIA PACIFIC J. Med. Toxicol.*, vol. 5, no. 2, pp. 55–64, 2016, doi: 10.22038/APJMT.2016.7668.
- [26] J. Rutto, J. Mwaura, A. Chepchirchir, and T. Odero, "Nurse's knowledge, attitude and practice on the initial management of acute poisoning among adult casualties: Study at Kenyatta National Hospital, Kenya," *Open J. Nurs.*, vol. 02, no. 03, pp. 149–156, 2012, doi: 10.4236/ojn.2012.23023.
- [27] L. Senarathna, J. Adams, D. De Silva, N. A. Buckley, and A. H. Dawson, "Personal and professional challenges in the management of deliberate self-poisoning patients in rural

- Sri Lanka: A qualitative study of rural hospital doctors' experiences and perceptions," *BMC Public Health*, vol. 8, pp. 1–7, 2008, doi: 10.1186/1471-2458-8-373.
- [28] S. Mohammed, A. Abdelaziz Ismail, A. Nagy, H. Al-Metyazidy, and Z. Allam, "Effect of Emergent Nursing Educational Program on Nurses' Performance for Patients with acute poisoning," *Tanta Sci. Nurs. J.*, vol. 21, no. 2, pp. 224–250, 2021, doi: 10.21608/tsnj.2021.190786.
- [29] Z. Zhang, "Model building strategy for logistic regression : purposeful selection," vol. 4, no. 6, pp. 4–10, 2009, doi: 10.21037/atm.2016.02.15.

11. Annexes

Annex I: Information Sheet

Title of Study: Preparedness and Experience of health care professionals in managing acute poisoning and its associated factors at Kidus Petros Hospital

Principal Investigator (PI): Dr Hana Mulat

Good morning/good afternoon

My name is Dr. Hana Mulat I am currently conducting research with the objective of assessing the preparedness and experience of healthcare professionals in managing acute poisoning and its associated factors at Kidus Petros Hospital.

Introduction

You are invited to take part in this study because, you are healthcare worker working at Kidus Petros Hospital and you have worked or is currently working in the ER(pediatrics and adult), ICU and toxicology center. To complete the questionnaire, it will take about 15 minutes.

Purpose

This research is conducted to assess the Preparedness and Experience of health care professionals in managing acute poisoning and its associated factors at Kidus Petros Hospital

Benefits

As a participant in this study, there may or may not be direct benefit for you; however, information from this study may benefit other people.

Risks

Participating in this study does not pose physical risk. There might, however, be risk associated with confidentiality which could be mitigated by protecting all the information collected.

Costs

There will be no payment to you for participation in this research study.

Confidentiality

All information collected about you during the course of this study will be kept without any identifiers (anonymous). No one will be able to match you to your answers. All information collected about you during the course of this study will be kept with a code name or number so that we are able to match you to your answers.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You are free to decline answering any questions. You may choose not to take part in this study, or if you decide to take part, you can change your mind later and withdraw from the study without any consequences.

Annex II: Consent form

I sincerely thank you for participating in this study.

Hana Mulat

By signing below you are agreeing that you have read and understood the Participant Information Sheet and your questions about your participation in this study have been answered satisfactorily and you are taking part in this research study voluntarily (without coercion)

Signature of the participant_____

If you have a question or concern feel free to contact me

Hana Mulat

Phone number – 0913974212 Email : hanamuabegaz21@gmail.com

Annex III: Questionnaires

Section I: Socio-demographic characteristic

1. Age
 1. 20-28
 2. ≤29
 3. 30-39
 4. 40-49
 5. ≥50
2. Sex
 1. Male
 2. Female
3. Marital Status
 1. Single
 2. Married
 3. Divorced
 4. Widowed
4. Profession/Education
 1. Senior Specialists
 2. General Practitioner
 3. Msc Nurse
 4. BSc Nurse
 5. Diploma Nurse
 6. Clinical pharmacist
5. Service unit
 1. Adult ER
 2. Pediatrics ER
 3. Toxicology
 4. ICU
6. Years of Experience
 1. <2 years
 2. 3-5 years
 3. 6-10 years
 4. 11-15 years
 5. >15 years

Section 2: Knowledge Questionnaire items (yes/no)

1. Poison is any substance capable of producing damage or dysfunction in the body by its chemical activity.
2. Dose ingested and time of ingestion are not very necessary consideration when managing poisoning cases in emergency department.
3. It is always very important to treat the poison not the patient.
4. The commonest cause of poisoning in developing countries is pesticide.
5. Women are more likely to take poison intentionally in an attempt to commit suicide than men.
6. Considering the dose and time of ingestion is important in managing the poisoning cases in Emergency.
7. Maintaining ABC is the priority during severe acute poisoning.
8. Atropine should be administered in any circumstance during organophosphate poisoning.
9. Gastrointestinal (GI) decontamination is dependent on the type, time and severity of poison ingested.
10. Gastric lavage is indicated for all cases of poisoning except for ingested kerosene or corrosive substances.
11. Vomiting is an alert for conscious patient who has ingested a substantial amount of a toxic substance within 60 minutes of presentation.

Section 3: Practice questionnaire items (Yes/No)

- 1-In severe acute poisoning, maintaining adequate airway, respiration and circulation are always a priority.
- 2-In case of organophosphate poisoning atropine should not be administered in any circumstance.
- 3-Nearly all poisoning encountered in accident and emergency department have their specific antidote.
- 4-The decision to perform Gastrointestinal (GI) decontamination should be based upon the specific poison(s) ingested, time from ingestion to presentation, and the predicted severity of the poison.
- 5-Emesis is to be considered in an alert, conscious patient who has ingested a substantial amount of a toxic substance within 60 min of presentation.
- 6-Activated charcoal can increase absorption of a wide range of poisons from the gastrointestinal tract to the entire human system.
- 7-Gastric lavage is indicated for patients who have ingested kerosene or corrosive substances within an hour of presentation.
- 8-The effectiveness of gastric lavage increases as the time between ingestion and treatment increases.
- 9-The volume of lavage fluid aspirated should approximate to the amount of fluid given.
- 10-Patients presenting following ingestion of controlled/ slow released substances may benefit from decontamination even after a longer delay (e.g. more than 2–4 h).

Section 4: Experience of HCPs in managing poisoning

1. What is the total number of years you have spent managing poisoning cases.
 - 1) < 1 year
 - 2) 1-2 years
 - 3) 2-3 years
 - 4) 3-4 years
 - 5) 4-5 years
 - 6) > 5 years

Section 5: Challenges and barriers

i) In-service training gaps:

1. Have you received any in-service training relevant to poisoning cases.
 - a. Yes
 - b. No

If no, skip the next 2 questions.

1. Rate the frequency of in-service training relevant to treating poisoning cases received
 - 1) Very Infrequent
 - 2) Infrequent
 - 3) Occasional
 - 4) Frequent
 - 5) Very Frequent
2. Rate the adequacy of in-service training relevant to treating poisoning cases received.
 - 1) Very Inadequate
 - 2) Inadequate
 - 3) Adequate
 - 4) More than Adequate
 - 5) Very Adequate

ii) Resource limitation:

1. Rate the accessibility of resources (eg. antidotes, medical equipment etc)
 - 1) Very Inaccessible
 - 2) Somewhat Inaccessible
 - 3) Accessible
 - 4) Mostly Accessible
 - 5) Very Accessible

iii) Work Overload:

1. Please rate your current workload using the scale provided.

- 1) Very Light
- 2) Light
- 3) Moderate
- 4) Heavy
- 5) Very Heavy

iv) Standardization of treatment protocols

1. Rate the accessibility of treatment protocols

- 1) Very Inaccessible
- 2) Somewhat Inaccessible
- 3) Accessible
- 4) Mostly Accessible
- 5) Very Accessible